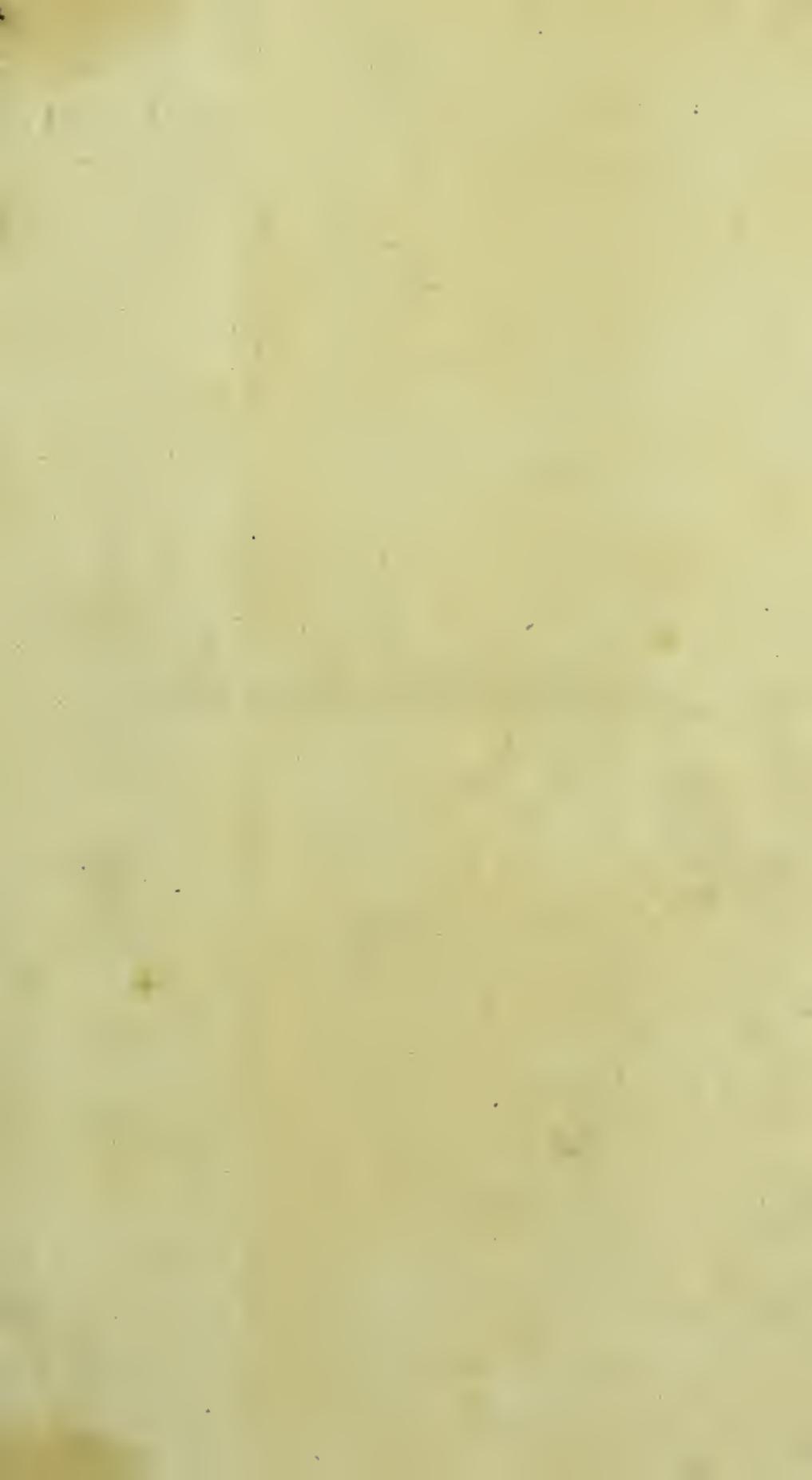




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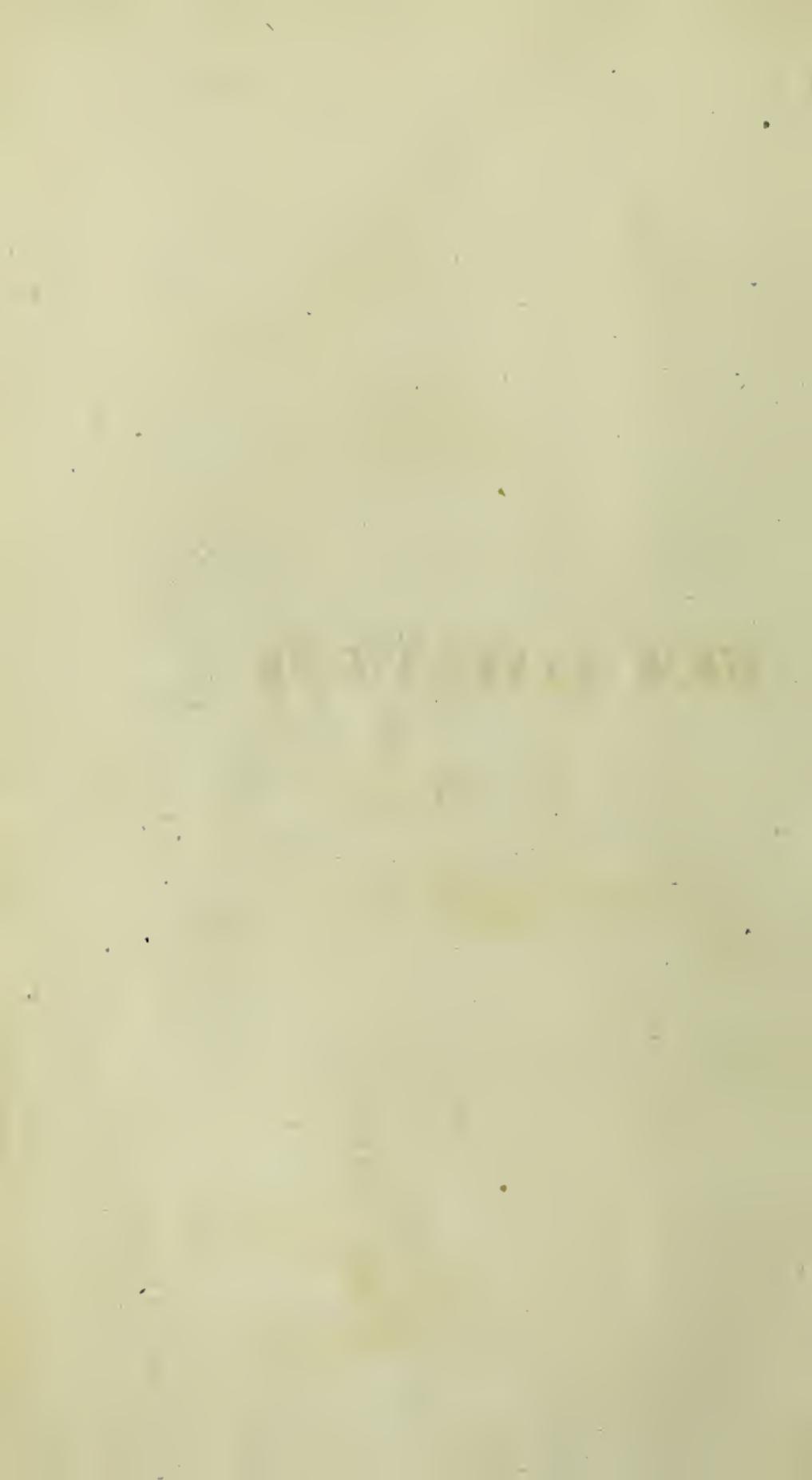
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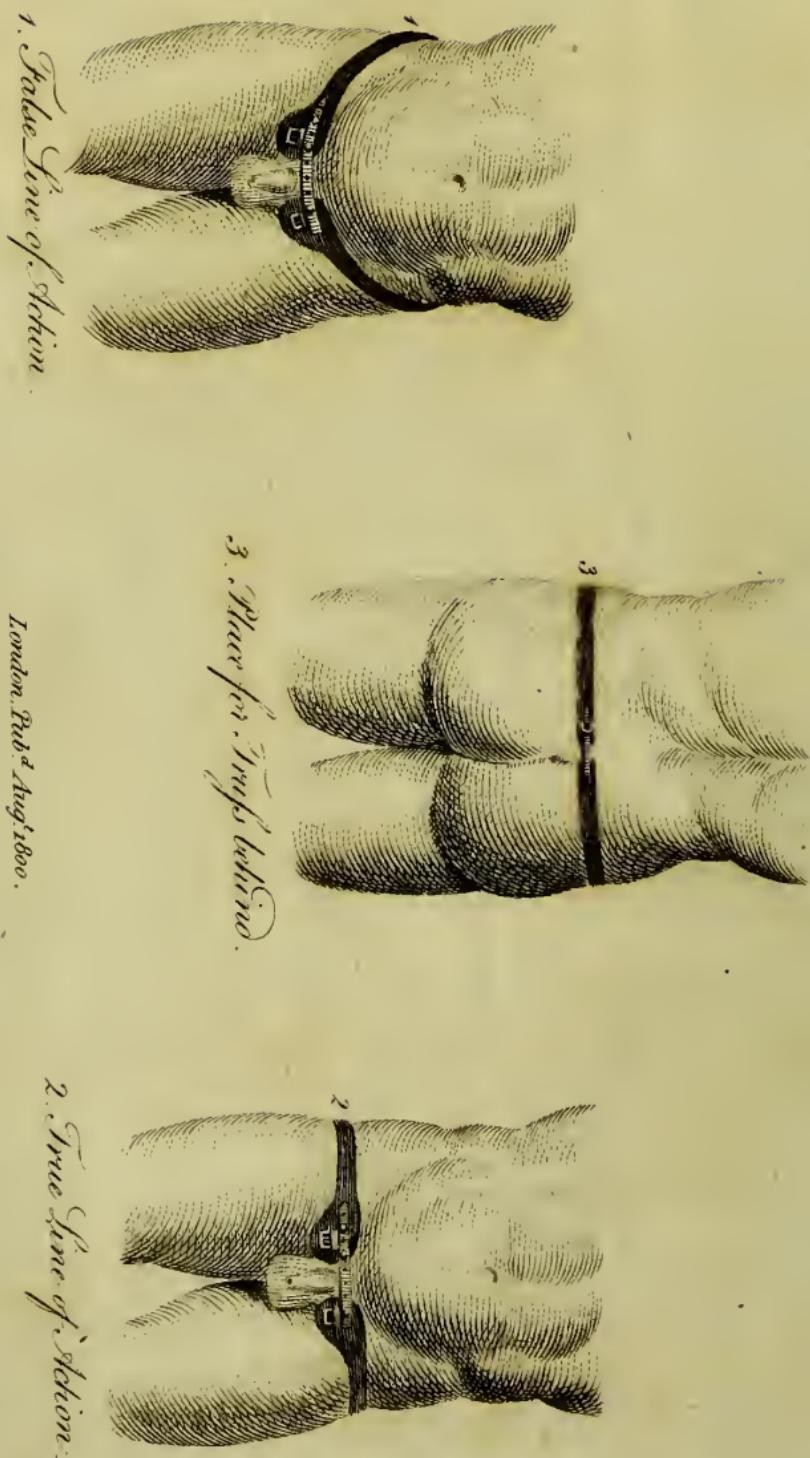
# NEW INVENTIONS,

*&c. &c.*



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London Pub'd Augt 1800.

# NEW INVENTIONS

AND

## NEW DIRECTIONS,

PRODUCTIVE OF HAPPINESS TO THE

# Ruptured;

WITH SOME

MILITARY AND PAROCHIAL CONSIDERATIONS

ON

# RUPTURES.

---

BY A PRIVATE GENTLEMAN.

---

“ Non ignara mali miseris succurrere disco.”

VIRGIL.

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## *DEDICATION.*

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TO the friends of the  
Ruptured, the following pages are  
most humbly and most respectfully  
dedicated

BY THE AUTHOR.

London,  
August 18, 1800.



---

## CHAP. I.

### *The Author's Case, and Motives of Publication.*

I SHOULD conceive myself ungrateful to Providence and cruel to my fellow-creatures, too many of whom are ruptured, if, after twenty-six years misery, I did not publish the causes of my present happiness. Ill health, procrastination, &c. has produced some delay. I thought that a plain recital of my case and habits would elucidate my new system. In every part of this publication, the reader will recollect, *all* the Observations are founded on facts within my own case, or the cases of others of my acquaintance; and I believe it will appear, that almost all my Observations are new, and necessary to be known by the ruptured.

B

I have

I have not the honour of being a medical man, but a private gentleman, retired from the army-rank of captain, having become incapable of duty, from the Rupture daily becoming worse than ever, down twenty times in a day, and have used a few medical terms for the sake of decorum.

From my earliest remembrance, I recollect a particular formation in my left testes, which was in an artificial sac: at the age of twenty-two, riding on horseback, both the omentum and intestine descended into this sac, and was there incarcerated many hours with dreadful agony. I did not then know what a Rupture was. My surgeon in the country, who reduced it, sent me to a truss-maker in London, and who was one of the best: he made an excellent *formed* truss.— The late eminent Mr. Potts, surgeon, to whom the world will ever be indebted, inspected and approved the old mode of putting on this truss.

I found the truss of little use: the thigh strap, which was of cotton, was *not* fixed to

to the hoop, it hitched on a brass knob, and constantly slipped off. On the most trifling exercise the Rupture descended ; half my time was consumed in reducing it, and often in great pain. Above twenty times I have felt all the agonies of a stricture, particularly about three years ago in Dublin, and expected my death for two days, preferring that, to the operation of cutting.

Nausea, sweats, shiverings, cramps in the legs, ensued — death was my only prospect ; when suddenly and unexpectedly, possibly from the fomentations used by my surgeon, the Rupture became reducible, and as far as I am able to form an opinion, a novel case happily for me, occurred. The Rupture was of that species, called *hernia congenita* ; and the inflammation has, as far as I can judge, *detached* the omentum from the testis.

The omentum is now reducible ; and since the improvements, the Rupture never descends into the sac, except when the truss is removed, and then it comes down to a great size. So powerful are the combined effects

of my improvements, that, with *safety*, I perform the *most* violent exertions on foot and horseback, both on the road and hunting.

From the same cause, the same happy consequences have attended even a weaver, porter, and other labouring men, to whom I have given trusses. I wear this double truss, with a steel spring, night and day, without inconvenience ; and from its immoveable position and use, happily forget both the complaint and the truss. For years, I laboured under, at times, the most excruciating pains from swelled testes ; the cause then did not occur to me : these pains were produced by the hard part of the truss injuring the spermatic vessels.

A repetition of these dreadful agonies, from a rough journey in a mail coach, opened my eyes, about two years since ; and from a very slender idea accidentally communicated to me, the simplicity of which, I then foolishly despised, I adopted the use of, and by various experiments brought to perfection,

ny calico cushion. Since which time, all  
pains in the testes have ceased, and the Rup-  
ture cannot descend. Twenty years ago, I  
attempted my system of immoveability, but  
did not succeed, the spermatics being unpro-  
tected. All the other ideas, and the mode  
of wearing the trusfs, are the result of six  
months experiments and thought, impelled  
by maturity by necessity, the mother of in-  
vention. And thanks to God, those ideas  
are in my own case, and in other reducible  
cases, annihilated the dreadful consequences  
of one of the most afflictive complaints, man  
subject to. I should observe, that some of  
the *same* trusses which were uselefs to me,  
*before* the improvements were used, are *now*  
usefull.—A most clear account of Ruptures  
given in the last edition of Chambers's  
Ctionary. See article *Hernia*.

## CHAP. II.

*Modes of reducing a Rupture.*

IN cases of stricture, the patient should on the side of his body, *contrary* to that on which the Rupture is ; by which position there *must* be a *lateral* recession of pressure from the aperture, which will give ease when the intestine or omentum cannot from inflammation *recede* through the aperture\*

Another position, in cases of difficulty, is to put a chair with its back on the ground, the patient's heels to be placed against a wall, and his head on the ground,

Let your breath be drawn in, before you attempt to reduce your Rupture.

\* I am indebted to Mr. Morpie, of Dublin, for this idea.

The act of breathing and speaking push down a Rupture.

Cover your fingers with the shirt or hand-kerchief, by which means the Rupture is gathered up with more ease and dispatch.

To render the practice easy to every one, I use the expression *knead* the Rupture upwards through the aperture, as dough is *kneaded* \*; but during a state of inflammation, touch the intestines very gently, if at all.

By comparing the ruptured side of the body with the sound side, it may be seen and felt when the Rupture is reduced.

Method makes every thing easy, therefore observe these directions in the *order* placed.

Motion

1. Lay down.—The head is to be lowered; heels raised.

\* In the act of kneading, the fingers are to be extended, gently and shortly.

**Motion**

2. Draw in the breath.
3. Be silent.
4. Cover the fingers with the shirt or handkerchief.
5. *Knead* up the Rupture.
6. Put on the cushion and truss.

## CHAP. III.

*On the Construction of a Trufs.*

THE pad should be rather *broad* and *flat*, though not *entirely* flat. A pad of this kind creates more pressure than those which have a round elevation in the centre, from a false idea of producing pressure *into* the aperture.

The hoop part of the trufs should be in a *true* circular line with the pad.

No edging of leather should project from the hoops of the trufs, nor any quilting or stuffing.

The thigh strap to be made of *wash-leather*, *lined* with thin tape, to prevent its stretching ; the end adjoining the buckle to be of neat's leather. The thigh strap to be *sewn*, with strong thread well waxed, to the

the hoop part of the truss; by *this fixture* of the thigh strap, the pressure will act on the bottom part of the pad of the truss.

The *bottom* part of the pad of the truss is the part that stops the aperture: a *double-tongued* buckle I have invented, instead of the lower brass knob—This buckle *draws*, and *fixes* the bottom of the truss close to the abdomen.

Where a double truss is worn, a suspensory bag, lined with flannel, the *ears* of the bag lined with soft leather, to unite to the buckle, has much pressure on the apertures. A piece of leather to prevent tearing being sewn on the hind part of the bag, to which the thigh straps are sewn.

Any method (contrary to the above) will fail of keeping up a Rupture with certainty.

The double-tongued buckle to be placed on the pad, in that manner, as to have effect. Speaking to the eye only, could in this case explain.

In all and every part of the trusses, in its sewing, its straps, its appendages, observe only one idea, and execute it:—Let there be *action*.

Many in this metropolis have talked about the mechanism of their trusses, their spiral springs, and the *dangers* of a circular steel spring.—I think and know, a truss cannot have proper effect without a steel spring.—It is not the spring, but the hard part of the pad of the truss that is dangerous, and has ruined many a man, by causing hydroceles\*, &c.

The double truss should be *united* behind by a double-tongued buckle and strap, to let out or take in; not by one horrid hard steel spring, cutting the loins to pieces.

\* See Mr. Potts's Works.

## CHAP. IV.

*A Description of a Cushion of Coarse Calico,*

About 1s. or 14d. per Yard, and Instructions how to form it\*.

CUT or tear a slip of *coarse* calico, about twelve inches in length, in a square form, of a size that it will *project* half an inch round the edges of the pad of the trusfs—then tightly fold over the first slip, many others. For a grown person, the thickness should be about half an inch: there is more danger of forming this cushion too thin, than too thick. Its thickness or thinness must depend on the size of the patient. When the hollow in the groin is completely filled up by it, and it remains immovable under the pad of the trusfs, it is then of a proper size.

\* Invented by the Author, from a very slender idea communicated to him.

This

This calico cushion is to be worn under the pads of the trusfs, and by men of science will not be esteemed the less, because of its external simplicity. The outer slip or two may be changed at pleasure, for the purposes of cleanliness, or restoring the cushion to a proper degree of thickness. This cushion, judiciously made, will, even with a bad truss, most materially assist in keeping up a reducible Rupture; and with a truss made and used according to the directions of the Author, *aided* by his other improvements, it will render the descent of a reducible Rupture *impossible*, as has been proved, notwithstanding the patient performs the greatest exertions of exercise or labour.— Where the omentum is *not* reducible, the application of this cushion is much preferable to the usual mode, by affording it protection from the injuries of pressure.

Its various and beneficial properties are immense, and would appear wonderful, if not explained.— First. It protects the spernatic vessels from being injured by the hard pad

pad of the truss, which injury often produces hydrocele, hernia humoralis, &c.

Secondly. By protecting the spermatic vessels from the injuries of pressure, it produces a desideratum *never* before obtained. It enables the patient to girth the truss round the body, with such an effective degree of tightness, that the Rupture cannot descend.

Thirdly. By uniting the properties of softness and solidity, it yields to the form of the abdomen, and thus completely fills up the aperture through which the Rupture descends.

Fourthly. It is an additional column of pressure, and the truss being tightly girthed, it keeps the omentum and intestines all round and above the aperture in such a state of quietude, that it lessens their power in descent, therefore less likely to protrude. On the plain mechanical position, that the smaller degree of force with which a body moves, the smaller force it possesses at the end of its action.

Fifthly.

Fifthly. It elevates the *pad* part of the truss to the line of elastic action with the *hoop* part, and thereby *preserves* and enforces its elasticity, retaining the truss in a state of effect for years.

Lastly. On the tight application of this cushion, the patient is also relieved from all rumbling pains arising from the internal descent of the rupture. And from its combined qualities, we accomplish the most difficult attainments. The being enabled to inflict pressure on substances naturally too tender to bear pressure, and thereby enforce a system of *immoveability*; without the adoption of which, the use of all trusses are inefficacious.

It is necessary to add, that either fine, old, or washed linen, will not answer the end; and a cushion after use, having acquired its form, is better than a new one. Its edges should be occasionally clipped; and this cushion must be formed in *separate* slips, as directed, folded over each other.

## CHAP. V.

*On the Mode of Wearing the Truffs for a Rupture in the Groin, and Directions to the Ruptured.*

AN old proverb says, “between two stools you fall to the ground.” Such is the unfortunate situation of the wearer of trusses. The art of putting a truss on the human body *appears* so easy and so simple, as not to be considered as any art\*. Few truss-makers are men of science, and surgeons have never scientifically considered the subject. Rules of science, of common reason, and the immutable laws of motion, have not been thought of. Ruptures descend, and patients die.

\* Every sportsman and good groom knows, that experience only teaches the *art* of putting on, *immoveably*, a saddle on the horse, for hunting or racing.

The usual mode of wearing the truss is, for no one reason in the world, but from an old custom — to raise the hoop part *on* the hips (*see Plate,*) several inches *higher* than the pad part, by which method, a false line of action is adopted, and of course a small pressure on the aperture. The hinder part of the truss is always put many inches too high; the following mode is effectual, and adapted for Ruptures in the groin. (*See the Plate.*)

Place the hind part of the truss as *low* down as the fissure or division of the posteriors; continue the hoop part or parts in a *true* circular line round the body, (the spring of the truss being made in a *true* circular line) this new-invented mode will keep the pad or pads of the truss *on* the apertures, producing to the wearer the most effective action, and removes the truss from a painful, galling, moveable, ineffectual situation —to an easy, comfortable, and effective *immoveable* one.

But it is necessary also to *unite all* the  
C Improve-

Improvements of the Author, to produce entire safety and effect, most *particularly* by first fixing by strong *sewing* the thigh strap to the hoop part of the truss; then draw this strap as *tight* and close as possible round the thigh to the *buckle* on the pad of the truss.—Tightness of girthing decreases, rather than causes the chance of galling, by destroying friction.

---

### *General Directions for the Ruptured.*

THE patient should have two trusses in his possession, fit for use.

He should *never*, night or day, be without his truss on; a cough in the night, might produce a fatal stricture.

He should *understand* the nature of his case from his surgeon, whether reducible or not, and be master of the subject as much as possible.

He should learn himself to sew the thigh strap to the hoop part, and have by him more thigh straps or bags, than trusses.

All persons, even if not ruptured, should, when riding on horseback, wear leather breeches, as they keep the intestines in a state of quietude, therefore less liable to protrude.

Be cautious, that the Rupture is quite reduced before you put on the truss; and in very young males, the state of the testes must be attended to.

A *double* truss, even for a single Rupture, is preferable, as it possesses a superior degree of pressure, to a single one, and might prevent a Rupture from coming on, on the sound side.

Another advantage of this mode of wearing the truss is, its *invifibility*.

When the double truss is put on, as it ought to be, it should be pulled so very tight, as to make the flesh *between* the two pads

rise to the thickness of the fore-finger : there will be no pain.

The single truss should be pulled tight as possible ; the cushion enables it so to be done, and *two* brass knobs should be invariably on the upper part of the truss.

Patients, whose Ruptures could not be kept up by the old mode, and who had, for above twenty years, tried all kinds of trusses, are now, by my plan, completely comfortable, and perform all exercises.

## CHAP. VI.

*A Cause of Rupture, hitherto unnoticed.*

I MUST point out one cause of Rupture, both inguinal and umbilical, hitherto unnoticed—I mean *the use of dumb bells*—in our armies and our boarding schools, for the purposes of expanding the chest, or obtaining exercise within doors. One case of a gentleman came to my knowledge, who became ruptured by, and in the act of using dumb bells, which caused these observations. Let any man of common sense observe their violent action on the body, and their effect is obvious. I hope this caution will banish them from our armies and schools—they are injurious to all, especially to young persons.

## CHAP. VII.

*A Recapitulation of the Author's Improvements.*

No.

1. THE fixture of the thigh strap to the hoop part of the trusfs, invented by the Author, twenty years ago.
2. A buckle and its double tongue.
3. The mode of putting on the thigh strap.
4. The calico cushion.
5. The mode of wearing the trusfs.
6. The application of the laws of motion.

Expla-

*Explanation of their Effect.*

## No.

1. Draws and fixes the lower part of the pad of the truss to the body, which *lower* part is the part that keeps up the Rupture.
2. It *fixes* the pad against the body.
3. It draws the thigh strap *close* to the flesh, thereby enforces action of No. 1 and 2.
4. See Chapter IV.
5. Exchanges pain, inutility, and moveability, for ease, utility, and immoveability.
6. Produces mechanic effect.

## CHAP. VIII.

*On the Cure of Ruptures.*

THE small anatomical knowledge I possess, forces me to think, that whoever promises to cure a Rupture, imposes on the feelings of the ruptured.

One worthy gentleman, in this metropolis, where speculators live by the miseries of mankind, promises a cure for one hundred guineas (money down) if his patient will lay *one* month in bed, generally in one posture, and observe one diet. Some say, *their* trusses will effect a cure--nothing can be promised. Some speculate in Ruptures, and the *charitable* feelings of the world.

It is seldom we can ascertain the state of the peritonæum, whether lacerated, dilated, or adhered; therefore, while the bottom of a tub is lost (to make a homely comparison)

How

How can the tub or belly be in a *useful* state?—So much for curers of Ruptures.—*When* the peritonæum is in its place, pressure and applications might restore it to health.

In King George the First's reign, the Parliament, or the Privy Purse, granted five thousand pounds to a pretended curer of Ruptures. Yet Queen Caroline, (see Lord Orford) lived wretched, and died of a Rupture.

Poor Michael Servetus, in a letter to the “Magnificent Lords,” at Geneva, who sentenced him to the stake, complained, “that the agonies of his Rupture added to the rigours of his confinement.”

I must quote from the ingenious Mr. White's Antiquities of Selborne, in Hampshire, an anecdote, he there relates, of a rustic mode of curing Ruptures in children, in a parish, the name of which I have forgot. “a young willow tree is fawn partly in two, the ruptured child is drawn *nine times through*

*through* the middle of the tree, which is then closed up, covered with clay, and tied together ; if the tree lives, the child is cured of its malady.”—A most easy remedy, and as efficacious as any I know of, except the pressure of a good truss.

## CHAP. IX.

*On the Phænomenon of the Rupture.*

I CALL the phænomenon of Rupture those inexplicable events that are not to be accounted for.—A Rupture will cure itself ; that is, the peritonæum will resume its position, and health, even in adults, without any apparent cause, as happened to myself, on the right side, twenty-four years ago, and also to a friend of mine.

A Rupture will sometimes have a proneness of descent, for weeks together ; the patient in equal health, and using no exertion but walking across a room ; and yet, at other times, it will keep up, though exertion is used, and the same trusses on.

A Rupture, either of the intestines or omentum, will sometimes most suddenly recede into their place, without any assistance of the patient.

## CHAP. X.

*Military Considerations on Ruptures.*

IT is the custom of the army to discharge ruptured soldiers from the service. In several regiments, I have known the ruptured men discharged, without being furnished with a truss. Some of them were out of England, and had many painful miles to travel ; each step was on the verge of death, from the danger of a stricture.

I hope this mode of discharge is not general in the service. From my improvements, a soldier, with a reducible Rupture, might perform any services, if he had time, and would occasionally inspect the straps of his truss : but for garrison duty, no man is fitter. By retaining the services of a ruptured soldier, much money would be saved to

to the government, and a little trade in Ruptures put a stop to.

A well-looking young man, with a Rupture, enlists in the army and receives his bounty : by a collusion or negligence this Rupture is not known, till too late ; the soldier is discharged, the Rupture is said to come down after the enlisting, and a *diligent* young man will soon make twenty or thirty pounds of a Rupture.

I have seen a ruptured woman, who was discharged from one of our greatest Hospitals in London, without a truss, after being a patient there and suffering the horrors of a stricture, *and* the operation of cutting. In five minutes after her discharge, she might have wanted cutting again.—Gracious God ! awaken us to a sense of the miseries of the ruptured.

## CHAP. XI.

*Parochial Considerations.*

IT is to be lamented, in a country peculiar for its humanity and wisdom, that the Ruptured poor, merely for want of operative detail, should suffer ; that a fellow creature should languish for years, become burthen-some to his country, because a few shillings is not expended in a truss. The parishes of London, in some measure, provide trusses for their poor ; but I fear and know, that in the country, the parish officers know not what a Rupture is, and the ruptured wretch knows only by his agonies. I wish, that in every parish in England there was a society to furnish, and have trusses ready, for their own poor and their children : a small expence would provide it.

Conclu-

*Conclusion.*

**GENTLE** Reader, farewell ! Believe, without prejudice, that my Improvements are facts, not speculations. If you have a reducible Rupture in the groin, a literal, full, and accurate attention to my rules will produce happiness. Your feelings and observations, when you begin to apply them, will be thus :

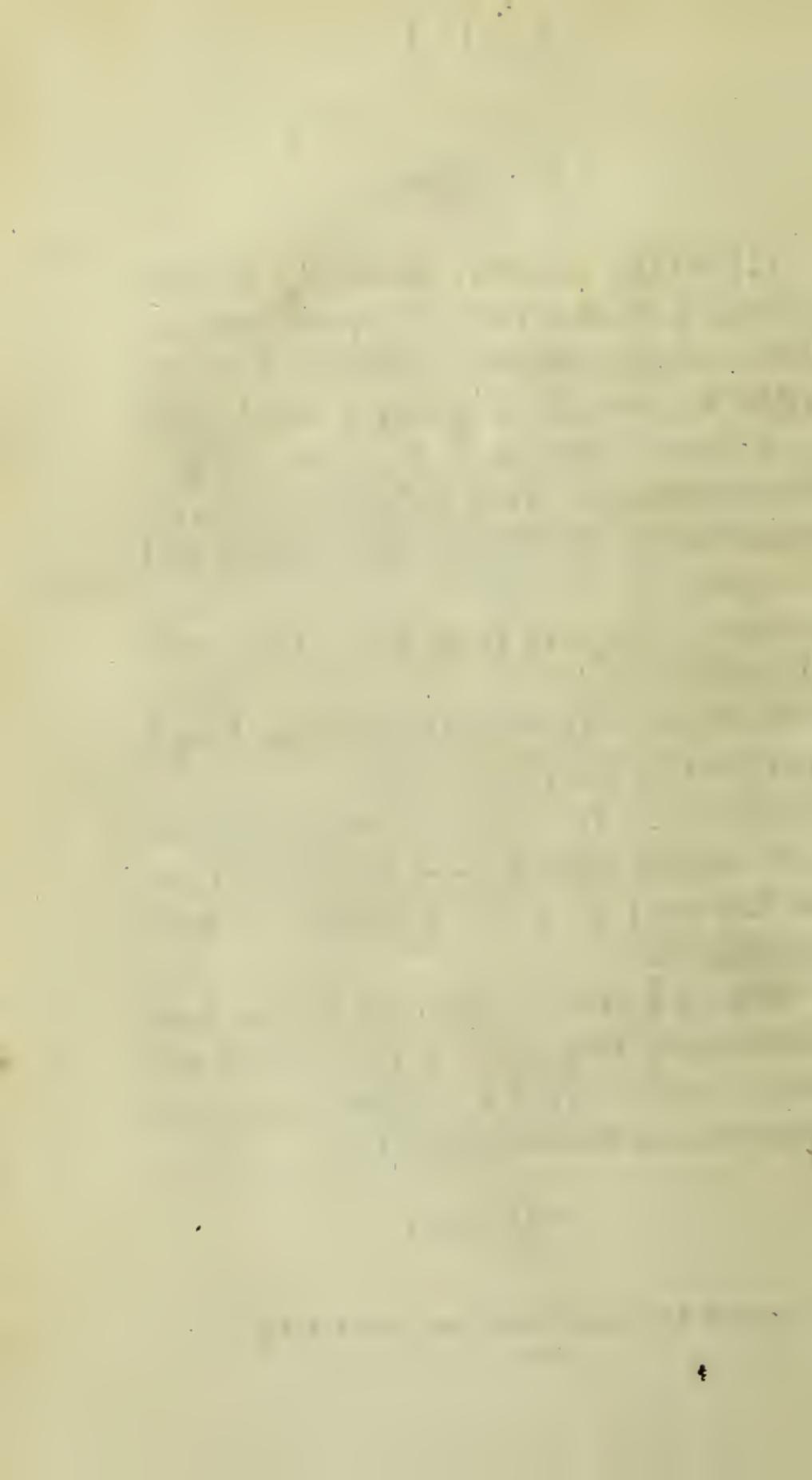
First You will *think* your Trusfs will drop off.

Secondly. You will *think* you are bound so tight that you cannot walk.

Thirdly. Try ; and in five minutes you will exclaim—I am well—I am sound—I feel no Rupture ; and you will walk or ride with perfect ease.

During a seclusion from the world, from bad health, Ruptures and Trusffes were my hobby horses. And I have made great improvement in the Umbilical Trusfs.

THE END.



CURSORY ACCOUNT  
OF THE  
VARIOUS METHODS  
OF  
SHOEING HORSES,  
HITHERTO PRACTISED;  
WITH  
INCIDENTAL OBSERVATIONS.  

---

  
BY  
WILLIAM MOORCROFT.

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LONDON :

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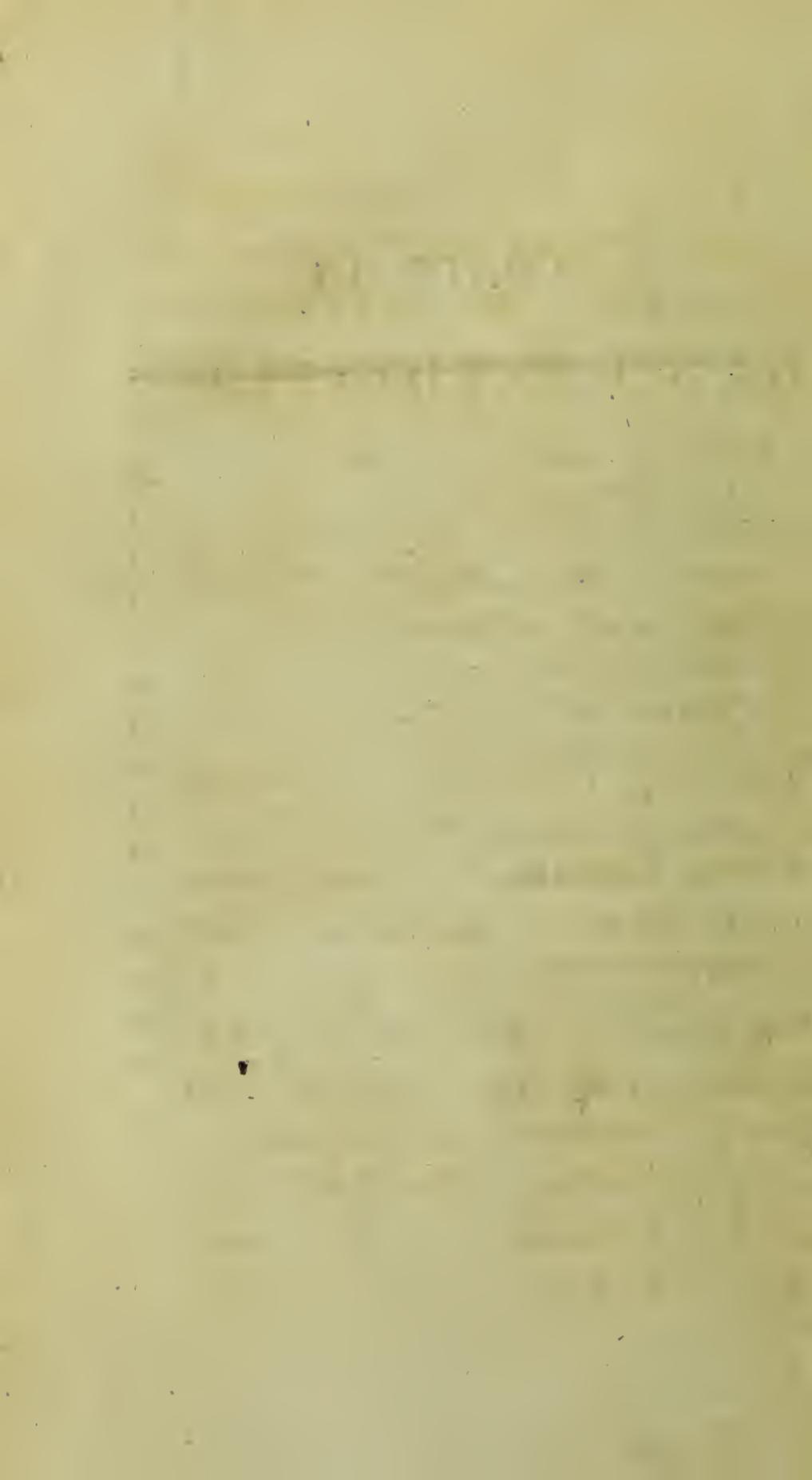


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TO THE  
RIGHT HONOURABLE  
FRANCIS AUGUSTUS  
L O R D H E A T H F I E L D,  
BARON HEATHFIELD OF GIBRALTAR,  
LIEUTENANT GENERAL IN HIS MAJESTY'S SERVICE,  
AND COLONEL OF HIS MAJESTY'S TWENTIETH  
REGIMENT OF LIGHT DRAGOONS.

MY LORD,

THAT a large proportion of the horses in this country are rendered useless by diseases in their feet, long before the strength of their bodies becomes in any material degree impaired, is a fact of general notoriety.

The feet are certainly more exposed to wear than any other part of the body, and thence, are necessarily more subject to disease; yet lamenesses in these parts do not so much arise from the labour the horse undergoes, as from circumstances connected

with shoeing. To lessen materially the number of these accidents, is an object of perhaps more importance, than to discover the best manner of treating any particular disease to which the horse is incident; as the former occur every day, the latter, comparatively, seldom. This, therefore, must serve as an apology, for offering to the public, my opinions *on Shoeing*, rather than on any other branch of Veterinary Science.

It has been long observed, that certain shapes of shoes produced lameness more frequently than others; from which it follows, that there must exist certain principles as to the construction of the shoe, and as to the manner of its being applied to the foot, which, if carried generally into practice, would afford a more firm support to the weight of the body, and cause the foot to retain its natural figure and soundness, for a much longer time than is now found to be the case. In the following sheets, I have endeavoured briefly to shew what these principles

are; and in doing this, I have not been so desirous of displaying novelties of practice, as of bringing forwards what is of most utility. Hence it may seem, that in some instances, I have borrowed ideas from other writers; and this may be true, without my being conscious of it; as many of these ideas have taken root in my mind so deeply, as to render it impossible for me to distinguish such as were started by others, and have been confirmed or denied by my own experience, from such as have arisen from my own practice alone.

Whilst investigating the principles of Shoeing, I became aware, that although I might ascertain what shape or construction of shoe was best adapted for general use, it was indispensably necessary, at the same time, in order to its being generally introduced, that it should be in the power of the most indifferent workman to forge it, at least as easily as one of the most inartificial form. For if much skill was required to

manufacture such a shoe, it could obviously be only made by good workmen, and would necessarily be sold at a higher price, than one in the making of which less labour and skill were employed. And farther, it would naturally lead a workman, in all instances, to recommend and adopt such a shoe as he could make with the greatest ease and profit; and to decry such as it was beyond his power, or incompatible with his profit, to manufacture. Now, unfortunately, it appeared, that the shoe which afforded the prospect of becoming the most extensively useful, required much accuracy of workmanship, and was therefore liable to the objections just adduced.

The probable employment of such a shoe was so limited, as to promise little benefit to the public at large, or little advancement to this branch of science. It seemed essential, to reconcile the interest of the farrier with that of the public; and this appeared only attainable by improving the art of manufac-

turing the shoes. The great advantages derived from introducing machinery in lieu of manual exertion, in many of the mechanical arts, naturally led me to consider of a mode of applying it to this purpose.

And whatever my expenses, whatever my anxiety in making a great variety of experiments may have been, I feel myself already in some degree recompensed by the reflection, that I have prosecuted to the utmost of my power, a subject in the immediate walk of my profession, and which appears to involve a matter of some interest to society. However, I trust, that at a period not far distant, I shall be enabled to offer to the Public, better shoes than have usually been made, at a reasonable price, and that in such a way as will promote the interests of farriers in general. As a manufacturer of Horse-shoes, I hold it incumbent on me to recommend that principle of shoe, which my past experience has shewn to be the best;

and I disclaim any other merit, than that of having, by means of machinery, procured at an easy price, the use of an article which was not before easily attainable.

I should not discharge the duty I owe to the public, and to myself, were I not at this moment, to urge the necessity of attending to certain principles in shoeing, in order to guard, at any future time, against the attempts of persons to pass off shoes, of which the only recommendation may be their immediate cheapness. In this, I mean nothing personal. With regard to the shoes made by my machinery, I rest my expectations of the public opinion, both as to their form and other properties, on the result of public experience, being well assured, that the trial will be fair, and the verdict just.

In the prosecution of this plan, I have experienced much kindness and patronage from many gentlemen; but from your Lordship in particular, I have uniformly and unre-

mittingly received encouragement and support, to a degree of which I am unable to express my feelings.

I trust I shall be forgiven, when I add, that I am the more flattered by your Lordship's approbation, from a conviction, that the good opinion of one so eminently qualified to judge of the subject, will, in the eye of the world, give a sanction to the invention, which I could not have ventured to hope for from any exertions of my own. Allow me, therefore, to subscribe myself, with respect and gratitude,

MY LORD,

Your Lordship's much obliged,

and obedient Servant,

WILLIAM MOORCROFT.

*Oxford Street,  
March 25, 1800.*



## CURSORY ACCOUNT, &c.

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IF a horse were to go without any defence to his feet, on the pavements or roads in this country, the outer parts of the foot would unavoidably be broken, worn, or otherwise injured in a very short time.

Shoeing is obviously intended to prevent these evils.

Experience, however, daily proves, that shoes occasion many alterations in the form of the hoof, and various diseases in parts within it, which do not occur when the foot is exposed to wear in its natural state: but, as it is admitted on all hands, that some coating or defence is absolutely necessary to guard this part from injury when a horse is worked, it becomes of importance to inquire what kind of shoe is best adapted to this purpose, and is of itself attended with the fewest inconveniences.

A review of the history of Horse-shoeing shews, that within the last hundred years, shoes

of a great variety of forms have been strongly recommended to the public at different times. Each of these has been tried by individuals; each has had a temporary success; each has had its partisans; but none have ever been generally adopted. From this variety in the forms of shoes it is evident, that the first principles of shoeing have never been established so as to place the subject beyond all dispute; and it is the object of the present treatise to lay before the public some plain facts, which may tend to demonstrate the comparative merits of the different methods of shoeing hitherto practised. To do this, it is not necessary either to enter into an anatomical detail of the structure and natural history of the internal parts of the foot, or into a minute description of the external parts; with the division of which, into crust, sole, bars, and frog, it is presumed every one interested in the subject is sufficiently acquainted: but it may not be improper to mention some of the general functions of those parts which form the bottom of the foot, and are more particularly connected with the subject of shoeing.

The crust constitutes the principal and constant support of the foot.

The sole ties the lower edge of the crust toge-

ther; by its upper part forming a strong arch it affords a firm basis to the bone of the foot, and by its strength it defends the sensible parts within the hoof.

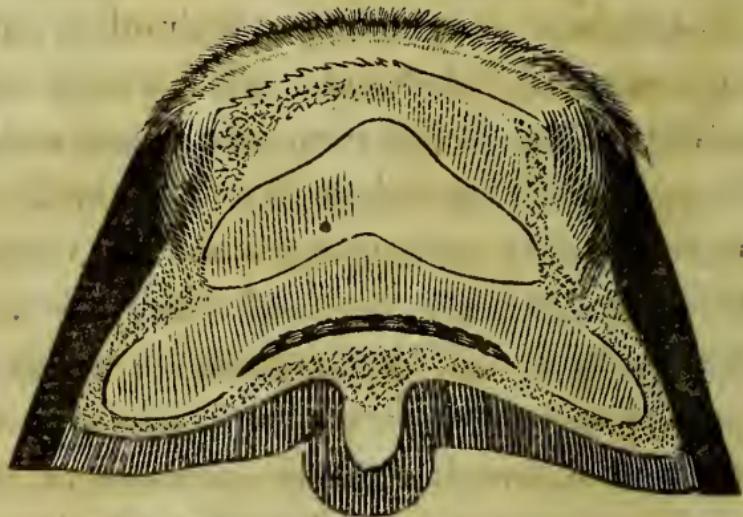
The bars are ridges, which like buttresses strengthen the sole, tend to prevent the sides of the foot from coming too near each other, and form a support and defence to the foot joint. The frog is composed of horn, of a nature much softer and more elastic than the rest of the hoof. It is intended to support a part of the weight of the body, to break the shock when the foot strikes violently on hard ground, to act as a spring in raising it, to steady the foot in slippery ground, to relieve it from the pressure of the atmosphere in deep ground, and as a wedge to keep asunder the heels.

The whole of the hoof is lined by a substance which has a very acute sense of feeling, and which it is of the utmost importance to guard from injury.

The lower edge of the crust is the part most exposed to wear, and consequently most in need of artificial defence. The sole, and especially that portion of it which joins with the crust, is next most liable to be injured; but the frog and

bars would scarcely suffer at all were the foot to remain unshod.

The following is a section of a foot crosswise, shewing the relative thickness and situation of the crust, sole, and frog.



It must be admitted as a general fact, that the greatest part of the weight of the body is supported by the shoe; and it must be equally obvious, that this support will be the more effectual the greater the surface on which it rests.

It happens, however, that the parts of which the bottom of the foot is composed, cannot all bear the same degree of pressure without being injured; hence, therefore, it becomes necessary

to confine the bearing to those parts which are found capable of supporting the whole of the weight without injury, and to prevent any pressure from taking place on those which would be injured by it.

Now, long experience proves, that the sensible parts within the hoof do not suffer if the crust or wall have a proper bearing on the shoe; but that if the horny or outer sole bear upon the shoe in any considerable degree, then the sensible or inner sole being pinched between the iron and horny sole *below*, and the bone of the foot *above*, the horse is lamed. It must follow, therefore, that in proportion as a greater quantity of the crust is brought to bear flat on the shoe, the firmer the horse must stand; and the less likelihood there is of any pressure taking place between the sole and the shoe, the less chance will there be of his being lamed.

These principles ought to be kept constantly in view, and a shoe should be considered more or less perfect as it corresponds with them.

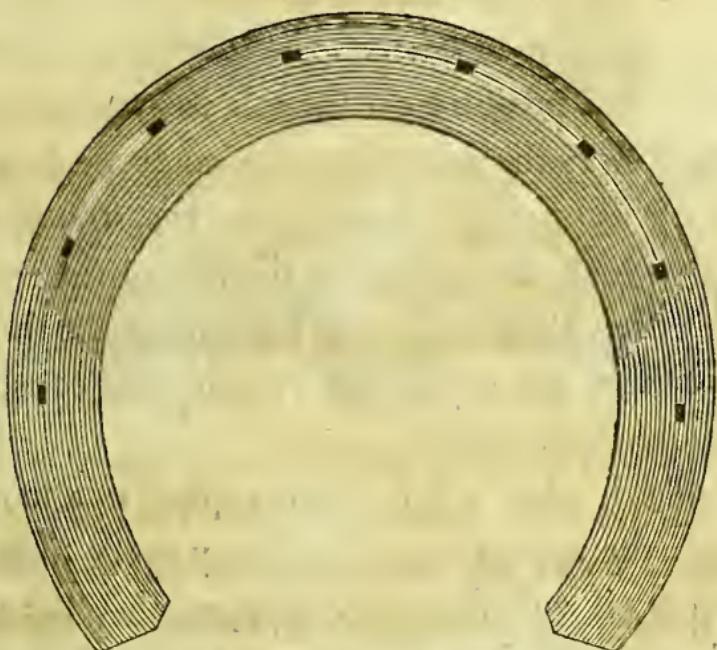
OF SHOES FOR THE FORE FEET.

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*Of the narrow Shoe, or Plate.*

A **FLAT** shoe, of the exact breadth of the crust, and of a moderate thickness, would defend this part sufficiently as long as it lasted; but as it would wear out in a few days, or even in a few hours, when the friction happened to be violent, and as very frequent shoeing is expensive, as well as hurtful to the hoof itself, this kind of shoe is only fit for racing, or hunting on soft ground.

It becomes adviseable, therefore, for the sake of *longer wear*, that the surface of a shoe be made broader than what is absolutely necessary for the *sake of support*; and this additional surface should be disposed in such a way as may be least likely to produce inconvenience to the foot.

*Of the Shoe with a flat upper Surface.*

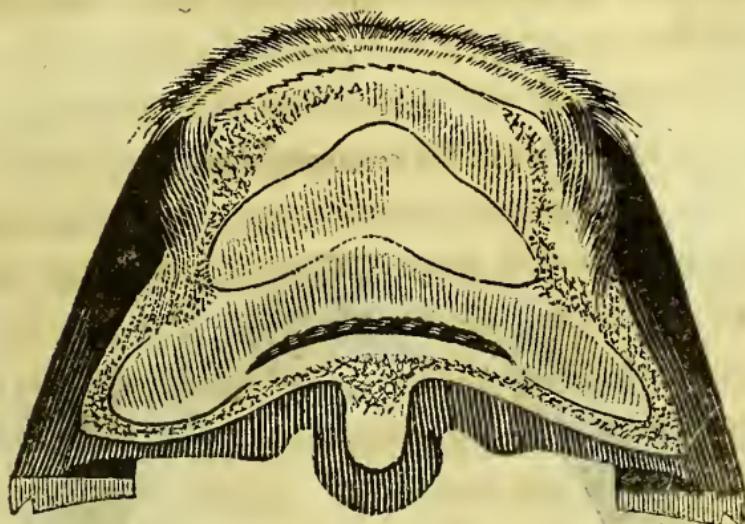
A shoe perfectly flat on its upper surface, such as is here represented, and broader than the crust, would in many cases press on part of the sole, if the sole were to be left entire ; but, in order to prevent this, it has been recommended to cut away part of the sole itself, so as to form a hollow between it and the shoe. It can scarcely be doubted but that a cavity between the shoe and the sole is necessary, not only to prevent actual

pressure, but also to admit a picker to remove dirt, which if not taken away would produce the same effect as if the sole itself were to rest on the shoe.

But though by this means the crust is certainly brought to bear on the shoe in its whole extent, and pressure on the sole is avoided; yet cutting away the sole must necessarily weaken it, and by continually putting on the stretch the bands which tie the bone of the foot to the crust, and which sling or suspend it within the hoof, make them less capable of resisting the constant pressure downwards.

Indeed, when a flat shoe is applied to a foot of which the sole is much cut away every time of shoeing, it will frequently happen that the sole will gradually lose its natural hollowness, and becoming flat around, constitute what is usually termed a *pumiced* foot. But if a hollow or very sloping shoe be employed, the hollowness of the sole will become greater than natural, in consequence of this part being forced upwards by the crust pinching it on all sides, whilst the weight of the body squeezes the lower edge of the foot down the slope of the shoe. This practice of cutting away the horny sole likewise, by depriving the sensible sole of a portion of its na-

tural defence, renders it subject to be bruised or wounded by stones or other hard bodies.\*



This figure shews the sole cut away as lately recommended, in order that the shoe with a flat upper surface, as here represented, may not come in

\* Feet become *pumiced* also from general inflammation of these parts; this constitutes the disease which is usually called *founder*: they also become *contracted* from injuries done to the coffin joint. If these defects come on gradually and slowly, they may be considered as connected with the method of shoeing, and may to a certain degree be remedied; but if they come on rapidly, they may be attributed to the causes just mentioned, and, generally speaking, they do not admit of a complete cure. From want of knowing, or of attending to the different causes of these alterations, much disappointment and expence have occurred, and more especially in cases of contracted feet; when, after filing away the

contact with it. The lower surface of this shoe is hollow, and consequently on hard ground can only rest on its outer edge.

*Of the common Shoe.*



The shoe in common use has its upper surface hollow, or sloping, regularly from the outer crust, which has been recommended as a specific, blistering the coronet, steeping the feet in warm water for several hours a day for months together, and turning out afterwards in moist land, it has proved that although the contraction was removed the lameness continued.

to the inner edge, and was probably so formed originally, to avoid pressing on the sole when left with its full thickness; but though this slope may at first prevent any pressure on the sole, yet ultimately it produces many and serious mischiefs.

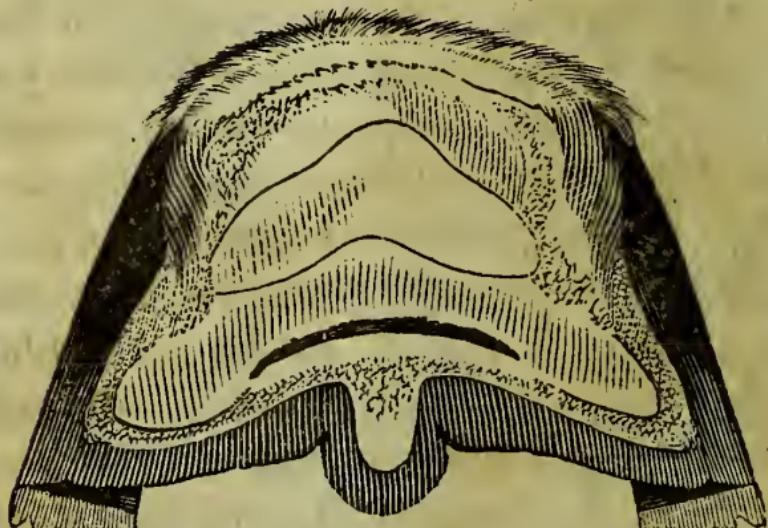
To give a general idea of the principal inconvenience arising from it, viz. contraction of the foot, it is necessary to observe that the hoof of a colt, which has never been shod, is nearly of a circular figure, and it may therefore be concluded that this form is best adapted to the different purposes of the foot. It is certain, however, that by far the greater number of the hoofs of horses which have been regularly shod for a considerable time, become longer from heel to toe, and narrower from side to side, but never shorter and broader.

The alteration of the lower part of the foot from a circular to an oval form, takes place gradually, and whilst it is going on, the thickness of the crust, in various parts, also undergoes a change; that is to say, at the toe it becomes much thicker than is natural, and, in a corresponding degree, thinner towards the quarters and the heels; and as this change always accompanies the lengthened state of the foot, it may be inferred that they both depend on the same causes.

When the foot has acquired an oval form, it is said to be contracted, although, in fact, there is no loss of crust, this substance being only improperly disposed.

The toe of the contracted foot is somewhat more pointed and sloping than it should be, the quarters are flatter and more upright, the sole more hollow, and the heels nearer together than they ought to be.

As in preparing the foot for the shoe the crust is generally cut rather sloping, so that its outer edge is left somewhat higher than that which joins the sole, and as the upper surface of the shoe slopes in an opposite direction, it is evident that only the outer edge of the crust can come in contact with the shoe, as is shewn below.



This *bearing part* is, indeed, able to support its proportion of the weight of the body, but it certainly is not capable of sustaining as much, with safety to itself, as if the *whole* of the crust were to rest on the shoe, and hence, from the excess of pressure, it is frequently crushed down and broken off. The shoe is usually put on so as to project a little beyond the crust, and the foot does in effect stand in the hollow of the shoe upon an edge, or narrow line, instead of being supported by a flat surface: and as the weight of the body reposes upon this narrow line of crust, which is in contact with the shoe, it naturally, and continually, tends to press the foot down the sloping surface of the shoe, into too small a compass, and thus this slope becomes the principal cause of oval and contracted feet.

The sloping surface of the two opposite branches of the shoe, acting like wedges upon the heels of the hoof, force them nearer together, and these are observed to be the parts of the foot which first give way to the pressure.

Whilst the contraction is going on in the outer part of the foot, the sensible parts within suffer more or less from compression; and hence lameness is a frequent attendant on contracted feet. The crust being forced inwards by the side

pressure at the heels, as just stated, and the sensible sole becoming therefore squeezed between that and the bar, is bruised, and blood oozing from it into the insensible sole, forms a red spot, which is called a corn.\*

It may easily be imagined, that from the toe being longer than natural, the horse must be liable to strike it against irregular ground, and that, from the foot being narrower, he must stand unsfirm; and it is well known, that horses having very long and narrow feet, are much disposed to trip and stumble.

From what has been before stated, as well as from a general view of the whole subject, it appears that a shoe ought to possess the following qualities.

It ought to be so strong, as to wear a reasonable time.

It ought to give to the crust all the support it can receive.

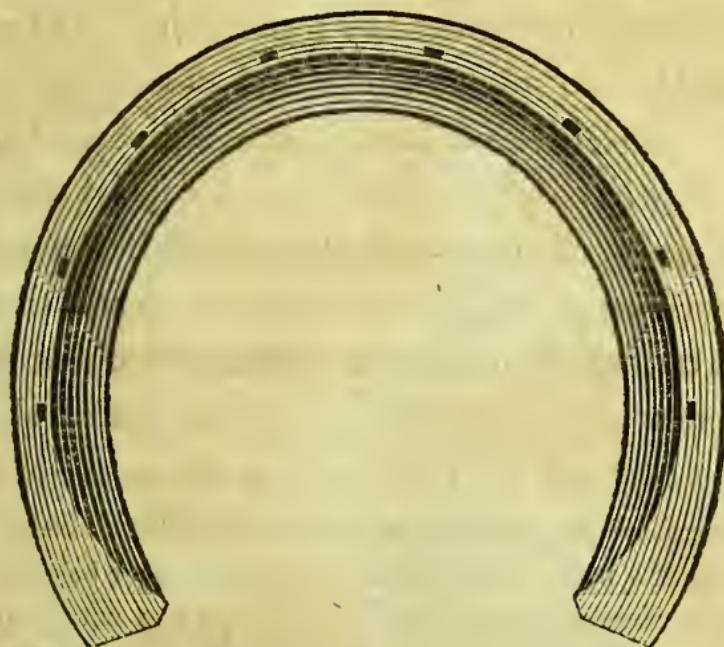
It ought not to alter the natural shape of the foot; and

It ought not to press at all on the sole, nor to injure any of the natural functions of the foot.

\* Corns are likewise produced by the sole resting *directly* upon the shoe.

*Of the Seated Shoe.*

The shoe best calculated to answer the purposes just mentioned, is that so strongly recommended by Mr. Osmer and Mr. Clark. The upper surface of this shoe consists of two parts; an outer part, which is a perfect plane near the rim, corresponding with the breadth of the crust, and called the seat; and an inner part sloping from the seat, and distinguished by the name of the bevel.



The seat is obviously intended to *support* the crust in its whole extent, the bevel to *lie off* the sole; and this part being made more or less broad, according to the kind of work proposed to be done, will give the requisite strength to the shoe.

As *the whole* of the crust bears on the seat, it is less liable to be broken than when only a *small part* of it rests on the shoe. In consequence, likewise, of the crust resting on the flat seat, the weight of the body has a tendency to spread the foot wider in every direction, rather than to contract it, as has been observed to happen with the common shoe: and it has in fact been found, in various instances, that a foot contracted by the common shoe, and afterwards shod with the seated one, has become wider without the horse having been taken from his usual work; and again, that a foot being of a full size and proper form when first shod with the seated shoe, has retained the same size and form without the slightest alteration, as long as the seated shoe was used.\*

\* On the 19th of November, 1797, a charger belonging to Lord Heathfield, was shod on his fore feet with seated shoes, struck in dyes, after the manner by which money is coined. The same individual shoes have been worn ever

By the slope or bevel in the shoe, a cavity is formed between it and the sole, sufficient to admit a picker, and to prevent pressure on this part, without the sole itself being hollowed, and consequently weakened.

For if it be one of the functions of the horny sole to defend the sensible sole, of which, from its situation and nature, no one can doubt, it must be evident, that the more perfect it is left, the stronger it must necessarily be, and of course the more competent to perform its office.

The value of every practical object is best ascertained by experiments ; and the results of the trials with various shoes, which have engaged the attention of the Author for several years past, have been decidedly in favour of the seated shoe. And, though he is not sanguine enough to sup-

since that period to the present day, the 25th of March, 1800. They have been removed regularly once every month, in order that the superfluous growth of the hoof might be taken away, but have never been altered in the slightest degree during this time except once, when it was found necessary to make each shoe a quarter of an inch wider at the heels, on account of the feet having spread so much, although they were of a very good proportion when the shoes were first put on. This case is brought forwards, not to prove the superior wear of these shoes, but to shew that this principle has produced all the advantages, which could be expected from any shoe.

pose, that this shoe will prevent lameness in every case, he is, nevertheless, warranted by experience to assert, that it will diminish its frequency.

As this shoe has been long known, it may appear extraordinary that it has not been more commonly employed ; and this circumstance might lead to a suspicion, that either farriers in general are unacquainted with its real advantages, or that, though in theory it may appear preferable to all others, yet that in actual practice it does not maintain its superiority. Neither of these positions, however, is well founded, for the Author can with confidence assert, as a general fact, that when a farrier is applied to for a pattern shoe of that figure, which from his judgment and experience he would most recommend, *and for which, on such occasions, a much higher price is given*, the seated shoe is in much the greater number of instances preferred to every other. This must be considered as a sufficient proof, that farriers are aware of its superiority, and the trials made by individuals have established its practical advantages beyond all doubt.

But it is not extraordinary, that a tradesman should endeavour to turn his labour to the greatest account, nor that the consumer of any article

should, in most cases, be seduced by cheapness.

The plain truth is, that a seated shoe cannot be made, in the way shoes are usually manufactured, at such a rate as to afford a reasonable profit at the common price of shoeing; while a sloping shoe requiring much less labour, can be sold to advantage at that price.

This circumstance, therefore, which no man conversant with the subject will venture to deny, explains sufficiently why farriers have adopted this shoe in general practice, in preference to all others, although it has never been recommended as the best.\*

The use, therefore, of the flat shoe, with the practice of hollowing the sole, must be considered

\* It has become a kind of fashion lately to declaim against the ignorance of farriers, and in no instance more than in what regards shoeing; yet, perhaps, more is urged against them in this respect than there is just cause for. It is not here meant to enter into a defence of many practices, relative to shoeing, which a more scientific inquiry, in latter times, has proved to be erroneous, nor to contend that there has not been much to censure in general; but justice impels the Author to remark, that he has sometimes met with farriers, who have possessed more real information than is to be found in the writings of those who have been so severe against them; and it must be remembered, that long continued practice and accumulated experience, furnish us with facts which no speculative disquisition or scientific research can afford.

as an acknowledgment of the propriety of the principles just laid down, with this difference only, that the means of avoiding pressure on the sole by the flat shoe, consist in cutting away part of the sole itself, whilst with the seated shoe part of the iron is removed, and the sole is left with its natural thickness, as appears from the following figure.



*Of the lower Surface of the Shoe.*

As a general principle, it must be acknowledged that the surface of the shoe, which is intended to bear on the ground, should be of such a form, as will afford the firmest tread.

Now a flat surface comes in contact with even and hard ground in more points than any other, and is therefore unquestionably the best: but to prevent a horse from slipping in soft and hilly ground, it is contended that the surface of the shoe should be rough; for hunting it has therefore been recommended that the lower surface be grooved, or that it be divided into two parts.

But the grooves soon fill up with dirt, and then this surface becomes flat, with the disadvantage of the shoe itself being weakened by the grooves.

And although when the surface is divided into two parts, like that next the foot, it certainly does afford a steady and firm tread in soft ground, yet the shoe is so much weakened by the bevel on both sides as to be very liable to be pressed against the sole; and should a horse so shod be ridden violently over stones or hard ground, the shoe would soon be worn thin by the friction being confined to the outer edge, and would break or become wider. In either case the nails would tear away with them the outer edge of the crust, and thus expose the sensible parts within the hoof to the risk of being injured at the next shoeing; and, at the same time, rob the foot of a portion of its natural support. A

narrow shoe with a flat surface will be found to possess more advantages for hunting than any other kind, and for common use a flat surface will also prove to be the best, both for security of tread and for wear.

### *Of Caulkings.*

Formerly it was a general custom to use what were called caulkings, which were made by bending the ends of the shoe. These were intended to prevent the horse from slipping ; and as at the time when they were first used the roads were not made of such hard materials as they are at present, the caulkings sunk into the ground, and the bottom of the foot had a pretty equal bearing upon it. This practice, therefore, was not attended with the mischiefs which ensued when the public roads were made more solid and even.

For when the caulkings cannot sink into the ground, they raise the heels so much as scarcely ever to allow the frog to touch it, and thus prevent that degree of friction and pressure which is essential for keeping this part in a healthy state ; for if the perspirable matter be not rubbed

from off the frog occasionally, it becomes putrid, and dissolving the surface where it chiefly accumulates, produces what is called a running thrush, which leads to the destruction of the part.

And as when the frog is ulcerated and rotten, it can scarcely afford such resistance as is necessary to keep the heels at their original distance, even when the crust rests on a flat surface, it necessarily gives way more rapidly than a sound frog to the pressure of the weight of the body, forcing the heels towards each other down the sloping surface of the shoe in common use. In consequence, likewise, of the heels being thus raised, the weight is thrown forwards upon the toe, the knees are weakened, and the fetlock joints are strained.

From the improved state of the roads, caulkings have gradually become less general, and, at present, two on each shoe are used for heavy draught horses alone; for the lighter kind, one on each shoe is employed; whilst for saddle horses, which are intended to be worked on the road only, caulkings are scarcely ever made use of, and in fact are never necessary, unless, perhaps, in frosty weather.

But although it has been fully ascertained, that horses may be hunted with safety in some countries without caulkings, yet it is always safer

for the rider, and commonly so for the horse, to have recourse to them. When two caulkings are used on each shoe, the inner one frequently wounds or bruises the opposite leg, and it has therefore been found most advantageous to have one only, and that on the outer heel; and, although its use may now and then cause some inconvenience, yet no expedient has been hitherto adopted, which is equally effectual in preventing slipping, and which of itself produces fewer accidents.

The back part of the caulkings of the fore shoe, should not be made so as to stand square or straight from the upper surface, but to slope forward, and under the shoe, so as to render it less liable to be caught and pulled off by the toe of the hind shoe, either when the horse becomes somewhat tired, or when going in stiff and deep land.

### *Of the Tip, or Short Shoe.*

More than two hundred years ago, it was a common practice to shoe the toes only of such feet as were contracted by improper shoeing, in order to cause the back part of the foot to expand by the weight of the body constantly pressing upon it;

and ever since that time, this method has occasionally been employed for the same purpose. But about the middle of the 18th century, the short shoe, tip or half-moon shoe, as it has been called by different writers, was strongly recommended for general use, under an idea that it would hinder feet from contracting, prevent corns, and other diseases, from taking place, and likewise give such a firmness of tread as to render caulkings, in every circumstance, totally unnecessary. And, as contracted feet in many instances had become wider from the use of this shoe, employed as a means of cure, it did not seem unreasonable to conclude, that its constant use might put an end to contraction altogether. But, however this practice might be at first approved by men eminent in their profession in different countries, the experience of a few years shewed, that though in fact it did prevent feet from contracting, yet it also brought along with it many inconveniences which did not exist when the common shoe was employed. For, if a horse so shod was much used when the roads were wet, it happened frequently that the horn at the heels was rubbed away faster than it grew, and thus the sensible parts within the hoof becoming inflamed and sore, the animal

was lamed; and from the weight of the body likewise bearing too much on the back part of the leg, strains were often caused in the hind tendons, and in the fetlock joints, and especially in such horses as were used for hunting or racing. And again, that this kind of shoe also required to be removed much oftener than the common one, in order to prevent the ends of it from being forced into the hoof, and to preserve the even tread of the bottom part of the foot by frequently cutting down the toe, without which, the heels soon become too low and the toe too long. On the whole, therefore, the disadvantages of the short shoe so much overbalanced the advantages, as to cause it to be abandoned for general purposes. And although, at various times since that period, attempts have been made to bring this shoe into general use, they have uniformly failed, from the effects just mentioned constantly resulting, so that the tip is now seldom employed, except for feet under circumstances of disease.

### *Of the Thin-heeled Shoe.*

On the failure of the tip, as a shoe for general use, it was insisted by some of those who had

entertained a full confidence in its success, that to preserve the foot in a healthy state, little more was necessary, than to allow the frog to come in contact with the ground at every step; and that this might uniformly happen, it was advised that the shoe should be thin at the heel, and gradually thicken as it approached the toe, where it should be three times as thick as at the heel. By means of this shoe it was believed that not only would the frog, when not diseased or cut away, bear on the ground at every step, but, that by the iron being carried up to the heel, it would possess all the good qualities of the short shoe, without any of its imperfections. Few objections were made to the principles of this shoe on its outset, on account of the plausibility of the theory by which it was accompanied; but its application in a general way did not completely justify the sanguine expectations which were formed of its success. For it frequently happens, when the shoe is very thin at the heel, that this part is bent out of shape, or broken, before the toe is half worn; and from its thinness, it plays against the foot like a spring, loosens the heel-nails, and is more subject to be thrown off than the ordinary shoe. It has one advantage over the short shoe, inasmuch as it

prevents the heel from being worn away faster than it grows ; but the objection of the weight of the body being thrown too much on the back tendons, still remains. Much caution is likewise necessary in employing this shoe on horses which have been accustomed to thick-heeled ones, in order that the back parts of the leg may gradually accommodate themselves to bear the increase of weight which is cast on them. For if this shoe be put on a horse which has always worn a thick-heeled one, it will frequently produce lameness, by straining the back part of the leg on the first trial, and more especially if the horse be ridden or driven fast.

That the tendons may not therefore suffer from being unusually weighted, it is advised to thin the heel of the shoe by degrees, and to cut away a proportional quantity of crust from the toe, in order to bring about something like an equal bearing. But, though this expedient may in a degree answer the end when the toe is long, it affords no resource when it happens to be short.

And it is scarcely to be imagined, that any mode of shoeing is likely to become extensively useful, which requires so much nicety of management to ensure its success. If the frog

come in contact with the ground at every step, it certainly follows, that the heels will be pressed farther asunder if they be then contracted, and this circumstance will likewise prevent their getting too near each other. But, although the thin-heeled shoe does allow the frog to strike the ground more frequently than a thick-heeled one, and consequently is so far better calculated to answer the purposes just mentioned, yet its long continued use is attended with an inconvenience from which the thick-heeled shoe is exempt.

For as by the thinness of the heel the weight is thrown too much on the back part of the leg, it of course operates equally on the back part of the foot, so that the heels and back part of the frog sustain more pressure than the toe and the fore part of the frog; and this disproportion of weight causes the heels and the back part of the frog to shelve and slope, as it were, under the foot, instead of growing nearly straight downwards. And this shelving or sloping direction of the heels under the foot takes place gradually and regularly, notwithstanding the toe be cut down frequently. By this change in the line of direction of the heels, the back part of the limb is deprived of its natural support at the time it most wants it, that is to say, when the

weight becomes more than usually thrown upon it. And by the heels being in effect made thus low, the skin is often brought against the ground and bruised. And here it must be remarked, that it is extremely difficult to restore to feet the proper direction and depth of their heels, when they have once become low and sloping.

One of the most specious reasons for having the toe thick, arises out of the fact of the wear being generally greater there than in any other part of the shoe; but surely it cannot be sound economy, that the true tread of the horse's foot should be destroyed, and that the hind tendons of the leg should be subject to perpetual risk of being strained, for the purpose of saving the price of one or two sets of shoes in a year, even if there existed no other less dangerous expedient which might answer the same end.

Experience, however, the surest guide in practical matters, seems to have established as a general rule, that it is more advantageous to the tread of man, that his shoe should be at least as thick at the heel as at the toe; and a shoe-maker would materially risk the displeasure of his customers, were he, with a view to increase the size of the calf of the leg, or to prevent the toe from wearing out, to make no other shoes than

such as were three times as thick at the toe as at the heel.

Is it not likely that common sense would reject such practice as unnatural and absurd? And it may easily be imagined what would happen to foot soldiers, thus shod, on a march, when loaded with their accoutrements, or to an opera dancer, whilst exhibiting his agility on the stage. And certainly it is not straining the argument, to compare in this point of view, the foot of a horse with that of a man, as they both answer the same end, and of course must both suffer, more or less, from thus continually going up hill.—Such being the disadvantages arising from the use of the thin-heeled shoe, it may be suspected, that it is a profitable one to manufacture. The reverse of this is, however, the fact, provided the shoe be made according to the pattern laid down; that is to say, that the branches regularly swell from the heel, till they meet at the toe, which should be three times as thick as the heel. And this gradual swell is unquestionably the only means by which the whole surface of the thin-heeled shoe can be brought to bear at once upon hard ground; but it requires more labour to make this than any other kind of shoe. And accordingly, workmen have hit

upon two expedients for keeping up the name and counterfeiting the principle of this shoe, so as to save them much labour. The first consists in making the toe thick, and in sloping it off so rapidly on the quarters, that if the shoe be laid on a flat surface, it will be found to touch it only at the toe and at the heels. This kind of shoe may with greater propriety be called a *thick-toed*, than a *thin-heeled* shoe.

The second is still more simple, the shoe being made as nearly as possible of the same thickness throughout, except within about an inch of the heels, where it is bevelled off suddenly to a thin edge ; and so *in point of fact* this shoe may be said to be thin-heeled, although *in point of effect* it is only a parallel shoe, robbed of a portion of its flat surface.

These are abuses of practice, and do not attach to the principle of the shoe just mentioned ; but they afford a strong proof, that if the principle were ever so good, it would not be generally adopted, from the difficulty of applying it fairly to practice.

*Of the Parallel Shoe.*

A foot which has never been shod, in general rests upon the ground in such a manner, that every part of it supports its due proportion of the weight of the body; and it is of as much consequence to preserve this natural tread, as it is to guard the structure of the foot from immediate injury: for if a larger proportion of weight be thrown upon a part of the foot, than it has been accustomed to bear, it will necessarily suffer from overpressure; and a long continuance of this will not only injure the foot itself, but will communicate more or less of false bearing to the joints, will strain the bands which tie the ends of the bones together, and destroy that just balance of power which naturally exists betwixt the different sets of muscles; intended to move the limb in different directions.

Now it has been shewn, that the thick-heeled shoe throws the pressure of the weight too much on the fore part of the foot; and that the thin-heeled shoe causes it to act too much upon the back part of the foot. And as both these extremes have very frequently proved prejudicial,

and are consequently unfit for general use, it remains to examine, what effects would result from a shoe of the same thickness at the heel, as at the toe. Here it must be obvious, that *with* such a shoe, the tread of the foot must be in the same plane, as if it were *without* a shoe. And as it is of the utmost importance to retain this even tread, it is clear that this can be effected with ease and simplicity, by the application of the parallel shoe, without the least necessity for having recourse to the difficult and complicated plan of cutting away the foot, in some parts excessively, and of leaving it untouched in others, in order to adjust it to the thin-heeled shoe. And if it be most advantageous for the foot, that the frog should come in contact with the ground frequently, that sort of shoe will surely be in this respect the best, which will allow the *whole* surface of the frog to have a *full* and *equal* bearing on the ground, instead of the *back-part* resting much more considerably upon it than the *fore-part*, as must necessarily happen with the thin-heeled shoe.

Formerly it was imagined, that the frog was liable to be bruised and hurt, if it came much on the ground, and shoes were made thick at the heels, to prevent this happening; but latterly a contrary doctrine has been held, and it

has been maintained, that the frog cannot be brought too much against the ground; and the heels of the shoe have been accordingly thinned, to allow of this taking place at every step.

In practical matters which admit of much theory, it is no unusual circumstance to find, that a system, which for a time was considered excellent, shall all at once lose its ground, and be displaced by another, the very reverse, both as to principle and effect. And on a mature consideration of the subject, the best and simplest practice has been found frequently to lie between the two opposite systems.

Now it must be remembered, that the frog has several offices to perform; among which, that of breaking the force of the blow when the foot strikes violently against the ground, is one of the most important. And for the due performance of this function, its flexibility and spongy nature are most admirably calculated. But if, for want of pressure and cleanliness, the frog becomes very soft and ulcerated, it no longer is able to defend the sensible parts immediately above it, from being wounded and bruised.

And as on the other hand, from being exposed to too much pressure, it is found to acquire a degree of hardness, nearly equal to that of any other

part of the hoof, and as it gains this hardness by losing its spongy nature, it becomes of course less capable of breaking the blow, and of preventing the jar from being communicated to the parts above.

As therefore it appears, that the frog may become too soft or too hard, from too little or too much pressure, it follows, that pressure in some degree is necessary to keep it in health. And although it is scarcely possible to ascertain what degree is best suited to this end, and the discussion of this point would afford ground for much speculation, yet the knowledge of the inconveniences which arise from the opposite extremes, has led to a practice equally distant from both. This consists in the surface of the frog, when the foot is just shod, not being left on a level with the lower surface of the shoe, but rather a sixth part, or a quarter of an inch short of it. And by attending to this simple rule, the frog has been found to remain sound, without becoming either very soft or very hard.\*

\* Although this rule cannot immediately be applied to all feet, yet it will admit of more general application, than at first sight may appear probable; and with proper management, might in time be adopted in almost every instance.

It may be urged against the parallel shoe, that it will wear out sooner at the toe than the thick-toed one, and this will certainly be the case; but may in part be remedied by leaving the toe solid, instead of making a groove or fuller mark round it, and may be entirely obviated, by steeling the fore part of the shoe of horses which wear much at the toe, or are constantly worked on a pavement.

Indeed it would be an excellent practice to steel all shoes; for by the toe being thus made harder than the rest, it would be prevented from being so readily rubbed away; and the waste would be nearly alike in every part, till the shoe was worn out.

The additional expence of steeling, is too trifling to be weighed against the advantage of the natural plane of tread being preserved to the last.

#### *Of the Shoes for the Hind Feet.*

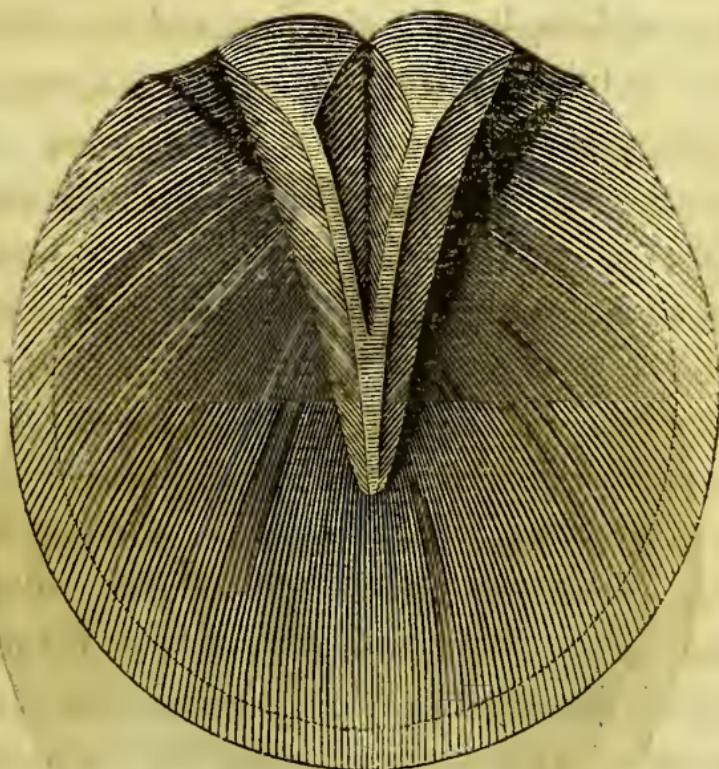
From the circumstance of the sole of the hind feet being much more hollow than that of the fore feet, a shoe with a flat upper surface, may be generally applied.

*Of preparing the Foot to receive a Shoe.*

The present being a work which treats only of the general principles of Shoeing, such precise rules as may apply to every particular case, cannot be laid down, but such methods as, by their simplicity, lead to a practice the most safe and most generally applicable, will be pointed out. Whilst the foot remains unshod, the different parts which form its bottom, wear away, and are replaced by a new growth; but a shoe, by covering the crust, and a portion of the sole, prevents this wear. Hence, therefore, the crust and the sole grow faster than they wear; and as after a certain growth they lose their toughness, and add an unnecessary weight to the limb, it becomes proper to remove the useless portions, and at the same time to leave the others in such a state as to afford a firm attachment for the shoe, and the necessary defence to the parts within the hoof.

However simple these points may appear at first view, they have led to material difference in practice. For with some, it has been customary to thin the sole very much, to hollow, or rather scoop out the greatest part of the bars, to pare away and trim the frog into a given shape, which

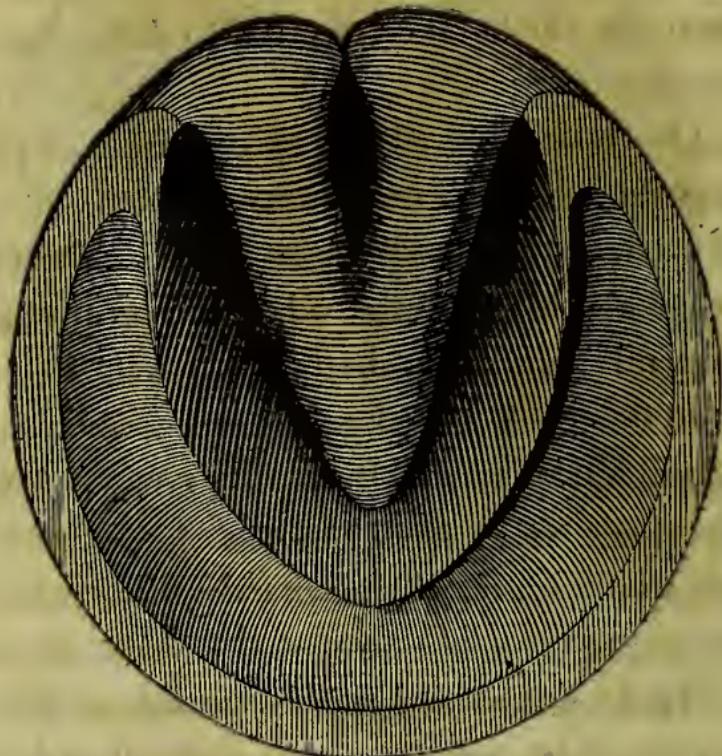
habit has rendered pleasing, and as it were necessary, to the eye of the workman; and to separate the frog from the heels, by making a wide and deep notch between them.



The frequency of lameness in feet so treated, gave rise, with others, to the practice of lowering the crust only, and of leaving the superfluous growth of the sole and other parts, to perish and fall off.

This, although a better practice than the former; had yet its inconvenience; and latterly,

another plan has been recommended, which consists in cutting away much of the crust at the toe, and little at the heels; in hollowing the sole throughout its whole extent, but especially in the corner of the heel between the crust and the bars, and in leaving the frog and the bars to grow in full luxuriance.



This method is obviously brought forwards to suit the thin-heeled shoe; for the removal of a considerable portion of the sole and crust at the toe, affords, as it were, room for supplying

with iron the place of the horn taken away, and thus aims at giving the natural tread to the foot; which however it almost always fails of effecting, from it not being in general practicable to take away from the toe a quantity of horn, equal to the quantity of iron added; that is to say, three times as much from the toe, as from the heels, the difference recommended between the thickness of the toe and the heel of the shoe.

The mischiefs which spring from cutting away the sole, have before been pointed out; and the groove at the heels, from being open at one end, and closed at the other and on the sides, frequently admits and harbours gravel.

On the whole, therefore, though there is much ingenuity displayed in thus contriving and adapting expedients, in some measure, to prevent the evils which would otherwise have occurred from the frequent use of a shoe with a thick toe, and flat upper surface, yet as the natural tread is absolutely destroyed by such a shoe, it certainly would be safer and more simple, to preserve it by a shoe of moderate and equal thickness throughout; and instead of sacrificing part of the sole to the shoe, to keep the sole in its full

thickness, and to remove part of the iron.\* It seems in theory, an easy matter to remove such parts as are become useless, and to leave such as are useful, untouched; but in point of fact, this is very difficult. This difficulty arises from there not existing any strong marks or lines, by which what is useless can be distinguished from what is useful; and therefore some dependence must necessarily be placed upon the judgment of the workman.

Since, therefore, there is not any line to point out the division between what ought to be taken away, and what ought to be left, it becomes necessary to look out for some other circumstance, which may serve as a guide in distinguishing them; and some important knowledge, in this respect, may be gained, by attending to the manner in which a foot, which has been long shod, is gradually disengaged of its useless portions, when left to itself.

When the shoe is taken off, the crust will be found to have grown beyond the level of the sole, the surface of which will appear irregular,

\* As this is a matter of great importance, the Author trusts he shall stand excused for having recurred to it more than once.

and marked with cracks in various directions, and the edges of the frog will generally be ragged.

Now, as the hoof continually grows, whether it be worn away or not; in the latter case, the newly-formed horn, pushes before it the outer part, which, when it has attained a certain distance from the vessels within the hoof, no longer receives any moisture from them, and thus becoming dry, loses its attachment with the living horn, and falls off. Thus, the dead portion of the crust gradually breaks down in small pieces, till it reaches the level of the tough and living sole. The sole separates in scales of an irregular form, but generally thick near the frog, and thinner as they approach the crust; and frequently the upper part of the bar comes away with that portion which it joins, leaving the top of the bar, which remains on a level with the remaining sole.

The old frog, in detaching itself from that underneath, does not observe a mode equally regular with the sole, as sometimes it separates in one continued layer, and at others, in small fragments; but in the latter case it has been usually undermined, by its perspirable matter having become putrid from being confined, and

dissolving, partially, both the old and new substance of the frog, where it happens to have lodged.

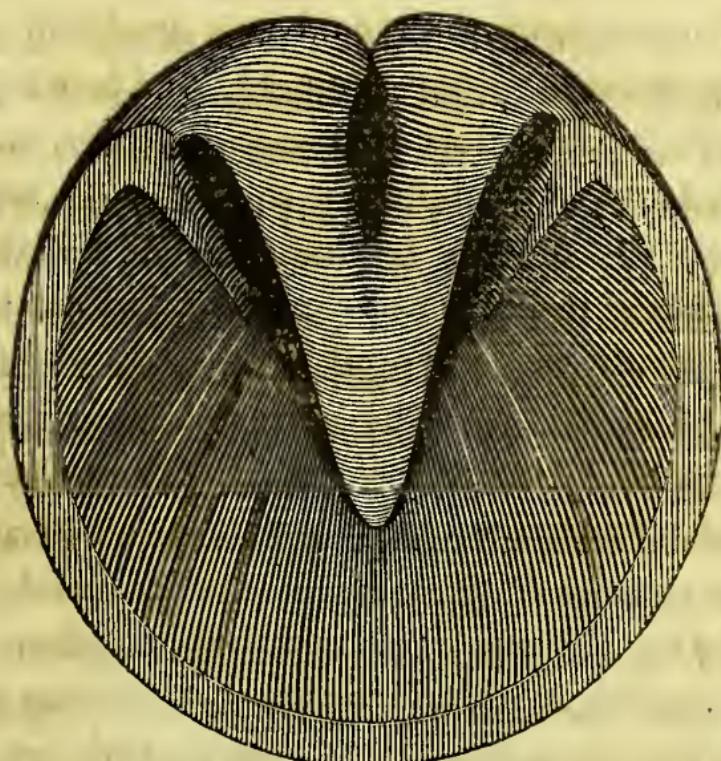
The business of the workman, at each time of shoeing, should be to imitate this natural operation, and therefore the Author recommends; That the crust be reduced to a level with the edge of the tough and living sole, and be left perfectly flat, in order to come in contact, in its whole extent, with the flat surface of the seated shoe; that the sole be made smooth, by taking away the dry and crumbly dead horn, which renders its surface irregular, but that none of the tough or solid horn be removed; keeping always in mind, that it is better for the foot to leave a little of what may be useless, than to take away the smallest portion of what is really useful.

That the bars be pared flat, so that their surface be left on a level with the sole; but that they be not thinned or scooped away, either on the side next the frog, or that adjoining the sole.

That the ragged edges of the frog be removed, but that none of the tough and living substance be taken away.

As the bars and the frog are more exposed to wear than the crust and the sole, they necessarily require less assistance from art, to free

them from their useless portions; and from the latter part, no more ought to be taken away than is necessary for rendering the surface smooth, and for preventing dirt from being harboured in the clefts.



*Of the Nails.*

Eight nails for each shoe are found to be enough for saddle and light draught horses; but for such as are employed in heavy draught, ten are required. A smaller number does not hold

the shoe sufficiently fast; and a greater number, by acting like so many wedges, weaken the hoof, and rather dispose the crust to break off, than give additional security.

The manner of disposing the nails, has differed considerably at different times. Some writers have directed four to be placed on each side of the foot, and the hindmost near the heel, leaving between the two rows of nails, a considerable space of the forepart of the foot without any.

The nails thus placed, certainly confined the foot at the sides and heels, left the toe at liberty, and assisted materially the effect of the sloping surface of the common shoe, in altering the form of the foot from a nearly round, to a lengthened figure.

Latterly, it has been strongly recommended, to place the nails principally at the fore part of the foot, in order to prevent the heels from being confined. And certainly this is a wiser practice than the former; but as the foot should rest on the shoe in the whole extent of the crust, it may be thought, that the best way of connecting them in every part alike, would be that of placing the nails at equal distances from each other, in the whole round of the shoe.

However, the objection to this is, that when the foot strikes the ground with considerable force, the back part of it becomes a little broader than when it is in the air, or when the foot is at rest. This spreading is not considerable, nor does it extend far along the sides of the foot, but it is sufficient to act upon the hindmost nails, when near the heels; hence arises the necessity for there being a greater distance between the last nail and the heel of the shoe, than between any two nails. Accordingly it may be laid down as a general rule, that the last nail should not be nearer the heel, than from two inches to an inch and a half.

Such a distance has been found sufficient to prevent the heels being confined, and not sufficiently great to allow the shoe to spring, and loosen the last nails, as frequently happens when they are farther distant from the heel.

All the nails should be at equal distances from each other, except the two in front, which should be a little wider apart than the rest: this, however, is not a matter of essential consequence; but it is of importance that there should not be any nail in the middle of the toe. For, generally, the action of the foot on the ground has a direct tendency to push the shoe, as it

were, backwards along the foot ; and it sometimes happens that the shoe is actually thus displaced ; in which case it necessarily follows, that the nail in the middle of the toe, must be driven immediately against the sensible parts behind it, whilst the rest of the nails in great measure follow the line of the crust, and so avoid doing mischief to the parts within.

The nail-holes on the upper surface of the shoe should come through the seat, close to the edge of the bevel, that the nails may have a proper and equal hold on every part of the crust, which will be shewn by the clenched ends being each equally distant from the shoe.

As the nail hole is always made with a taper and square-pointed punch, a nail with a head of the same form, will fit it better than one of any other shape.

The most general practice to prevent slipping in frosty weather, is what is called roughing ; which is nothing more than making two caulkings to each shoe. This is liable to the objections before stated, of throwing the weight too much on the toe, and of the inside caulking sometimes wounding the opposite leg. And it is farther objectionable, because the caulkings soon wear down ; as, in order that they may take

the necessary hold on the ground, they are made sharp and thin. They therefore require being frequently renewed; and hence it generally happens, that a horse which is much worked in frosty weather, has his feet more broken and injured, than in the common wear of many months.

To prevent the necessity of frequent removes, several expedients have been put in practice. Sometimes a few nails, of a larger size than the rest, have been so put in, that the heads stood considerably beyond the level of the shoe; but when these did not break off, as was often the case, they soon wore down.

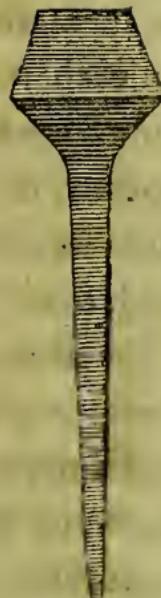
At other times, nails with large heads, tapering to a point, were screwed into the web of the shoe. Of these, one was usually placed at the toe, and one at each heel. And by this contrivance of the screw, it was imagined, that the nails might be easily replaced when worn out. They are apt, however, to break off at the neck, and are too expensive for common use.

There is, notwithstanding, another plan, which, as far as it has been tried, justifies the Author in recommending it.

This consists in having nails with a lozenge head, or what may be called a double countersink, terminating in an edge, instead of coming to a point. This greater breadth of surface, prevents its being rubbed away as fast as a point; the thickness in the middle gives it strength; and the regular taper to the shank, causes it to apply exactly to the sides of the hole in the shoe, by which it is equally supported, and prevented from bending or breaking. There should be four nails to every shoe; that is to say, two in the forepart, and one at each heel.\*

These nails are, in effect, so many caulkings, with the advantages of allowing a more level tread; of being easily replaced, by putting new nails in the old holes; and by being at a distance from the heel of the shoe, they are not so likely to hurt the opposite leg.

\* The heads of these nails must be struck in tools, or dies; the four holes in the shoe must be made to correspond with the neck of the nail; and when the nail is driven, the workman must cover the head with a tool, which will receive its upper part, and prevent its being injured by the hammer.



In the greater number of treatises which have been written on Shoeing, it has been usual to state what weight the shoes, for horses employed in different kinds of work, should be; but all rules in this respect must obviously be very general, as the respective weights necessarily depend upon the size of the hoof, the nature of the country where the horse is principally used. &c. However, as there has been as great a disposition to run into extremes on this as on every other point, connected with the subject of shoeing, it may be proper to observe that the Author has found it necessary to vary the weights for saddle horses from eight to sixteen ounces, and for carriage horses from twelve to twenty ounces.

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*Of Shoeing Horses which cut.*

To prevent a horse from striking the foot or shoe against the opposite leg, by which it is often bruised or wounded, is an important point; inasmuch as this accident occurs very frequently, and as it not only blemishes and disfigures the leg, but also endangers the safety of the rider.

The parts struck in the hind leg, are the inside of the fetlock joint, and the coronet; in the fore leg, the inside of the fetlock joint, and immediately under the knee; which latter is called the speedy-cut, from its happening only when a horse goes fast.

Young horses, when first backed, generally cut their fore legs, although naturally they may be good goers. This arises from their placing the foot on the ground too much under the middle of the breast, in order the better to support the burthen to which they are unaccustomed; but by degrees they acquire the method of balancing the weight, with the foot in the same direction it would naturally have were they without it. It may therefore be laid down as a general rule, with such horses, that till they regain their natural method of going, the edge of the inner quarter of the shoe should follow exactly the outline of the crust, but should not be set within the crust, nor should the crust itself be reduced in thickness; as both these practices tend to weaken the inner quarter, and to deform the hoof. And here it must be observed, that the outer edge of the shoe should, in all cases of sound feet, follow exactly the outer edge of the crust, except just at the heel;

where it should project a little beyond the line of the hoof.

Horses with narrow chests have their legs near together, and are apt to cut when they begin to tire ; and with these, the practice just mentioned should always be employed. Horses that turn their toes much outwards, are of all others most subject to cut. It has been asserted, that this defect also happens to such as turn them much inwards ; however, the Author does not recollect to have met with a single instance of this kind, in the course of his practice. In horses of the first description, it has been long observed, that the inner quarters of the hoof were lower than the outer, and that the fetlock joints were nearer each other, than in horses whose feet pointed straight forwards. These two facts probably led to a conclusion, that if the inner quarters were raised to a level with the outer, and so much the more as they were made proportionably higher, that the fetlock joints would be thrown farther apart, so as to admit of the foot passing by the supporting leg without striking the joint. Accordingly, for the two last centuries at least, it has been usual to make the inner quarter of the shoe higher than the outer ; and not only has this been the general practice, but

it has been regularly recommended by almost every writer, from that time to the present. And notwithstanding this method has very frequently failed of success, yet repeated disappointment appears never to have led to the circumstance of questioning the truth of the principle. Nay, indeed, the reliance placed upon it has been so strong, probably from the simplicity of the reasoning on which it was founded, that in the cases where it most particularly disappointed expectation, its failure was generally attributed to the practice not being carried sufficiently far; and accordingly the shoe has been still more raised on the inner quarter, and the edges of the crust and shoe have been filed away. When with these expedients it likewise failed, the last resource has been, a circular piece of leather placed round the joint to receive the blow of the foot.

It is now about four years since, that a shoe, with the outer quarter thick, and the inner one thin, was for the first time, in the practice of the Author at least, employed, in a case which had baffled many attempts on the old plan.

On the first trial the horse ceased to cut, nor has he ever done it since; which can only be attributed to his having constantly worn the same

kind of shoe. This circumstance did not then excite in the mind of the Author, any doubt, as to the propriety of a practice which had so long and so generally been acknowledged, but was rather considered as an extraordinary exception. However, other bad cases, which occurred occasionally since that period, were treated in the same way, and with the same success. These facts, at length, led the Author to conclude, that a practice, which was so uniformly followed by success, in cases where the established one as uniformly failed, must necessarily repose on a better principle; although for a long time he was completely at a loss how to explain it. For if the action of cutting did principally depend upon the faulty position of the fetlock joints, and the feet, with respect to each other; and it appeared to be generally agreed that such was the fact, it should seem, that a means which, by raising the outer quarters, must throw the fetlock joints still nearer to each other, would necessarily increase the defect in question; but as the reverse of this actually takes place, it might induce a suspicion, that there exists some other cause of cutting, which has been hitherto overlooked.

A minute examination of this point would far exceed the limits allotted to this division of

the work ; and therefore, at present, the Author will confine himself to that part of the subject alone, which is absolutely necessary to be understood. For horses, therefore, which cut their hind legs, the shoe, at the outer heel, should be from half an inch to an inch in thickness, according to the kind of horse, and to the degree in which he may cut. The web of the shoe should gradually become thinner till it reaches the toe, which should be of the ordinary thickness, and from which it should slope off, and end like a tip in the middle of the inner quarter.\* This shoe, in point of effect, would be equally proper for the fore feet, were it not that in such horses as are used for the saddle, the fore feet being more charged with weight than the hind feet, are more particularly subject to be injured, and a horse thus shod on the fore feet, might go unsafe ; therefore, it is expedient to let the inner quarter of the shoe be thin, and reach to the heel, but the outer edge should be bevelled off, so as to slope inwards. The same kind of shoe is equally well calculated to prevent the speedy-cut ; observing to bevel off, still more strongly, the part

\* For horses which cut only in a slight degree, a shoe of the same thickness throughout, but reaching on the inner quarter only as far as the middle of the foot, will in most instances be found sufficient.

which strikes, and not to put in any nails thereabouts. And here, it may be proper to remark, that in sound feet, the heel of the shoe should reach as far on the heel of the hoof, as to admit of the angle formed by the crust and the bar resting fully upon it, but it should not be carried quite as far as the end of the heel of the hoof.

In order to ascertain what would happen to a horse shod with different kinds of shoes, the following trials were made.

#### EXPERIMENT I.

A horse with a narrow chest, who had never cut, and having parallel shoes on his fore feet, was trotted at about the rate of eight miles an hour in a straight line, over ground sufficiently soft to retain slightly the impressions of the shoes, but not to admit the feet to sink into it.

Two parallel lines were drawn along the track, including between them the prints of the shoes. By these it was found, that there was regularly a distance of nine inches and a half between the outer edge of the near fore shoe, and that of the off fore shoe.

#### EXPERIMENT II.

Shoes thick in their inner quarter, and like a tip, reaching only half-way on the outer quarter,

were then used, and it appeared, that the distance between the outer edges of the prints of the shoes, taken as before, was regularly reduced to eight inches and a half.

## EXPERIMENT III.

The same shoes were afterwards placed on the opposite feet, so that the thick heel was on the outer quarter; and the result, under circumstances exactly the same as in the foregoing experiments, was, that the distance between the outer edges of the prints of the shoes, was regularly increased to eleven inches.

To account for these results, it is necessary to attend closely to the different effects produced by the weight of the fore part of the body acting upon the two fore feet, when raised on the inner or outer quarters, during the opposite states of rest and action. And first, with regard to shoes raised on the inner quarter: whilst a horse so shod, is standing still, the fetlock joints are certainly thrown farther apart than when any other kind of shoe is used. Hence, it was concluded, that the limb which supported the body would have its fetlock joint thrown so much outwards, as to keep it completely out of the way of the foot in motion. But it appears, that the impressions made on the ground by such shoes, are an inch

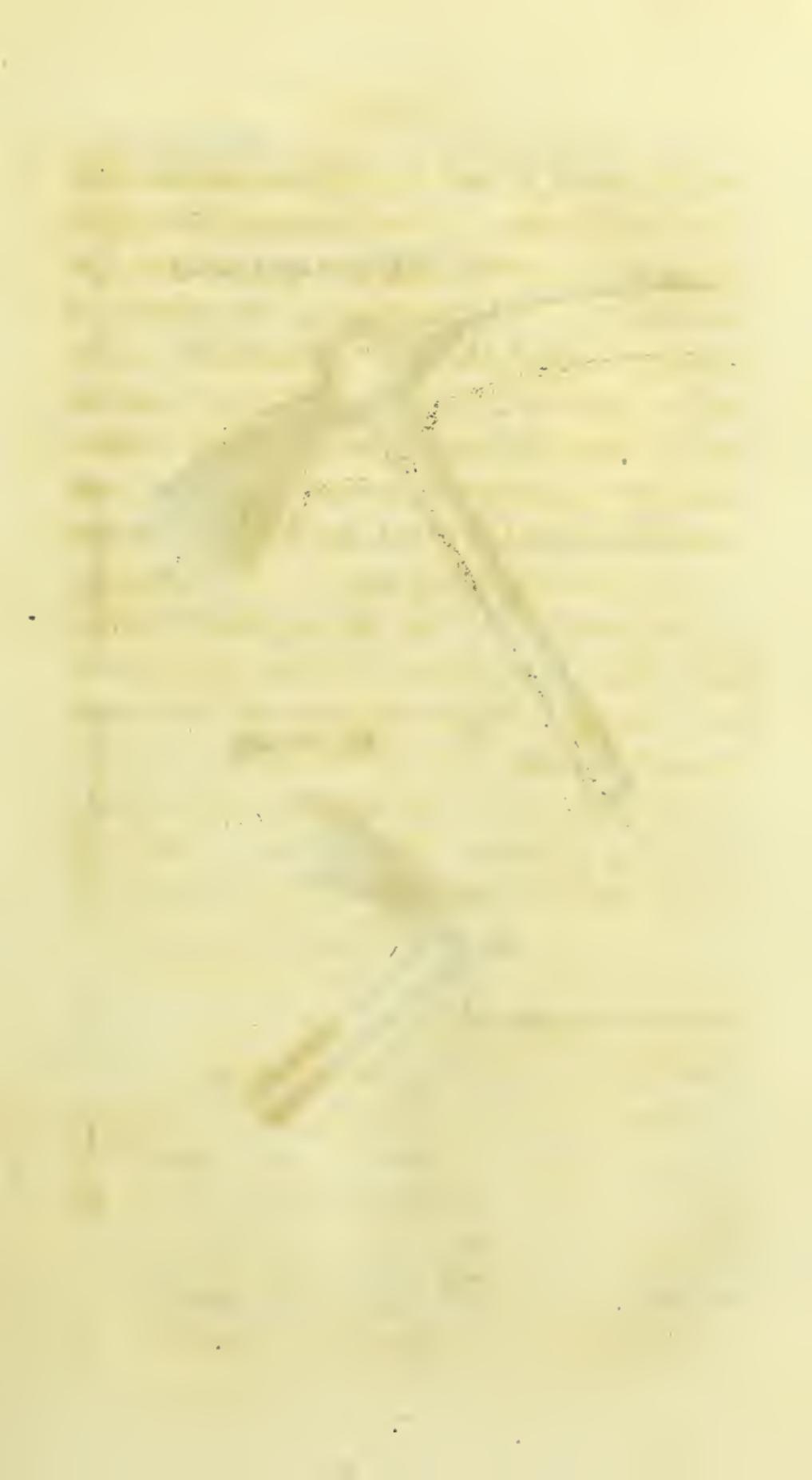
nearer together than those made by parallel shoes, and two inches nearer together than those made by shoes raised on the outer quarter. And this may be thus explained: when the horse is at rest, the weight is supported equally by the two fore feet, but the instant one foot quits the ground, the weight is suddenly transferred to the other; and by the outer quarter being lower than the opposite one, the fore part of the horse has a tendency to fall over to the outside. To prevent this, the moving foot is suddenly brought close to the fetlock of the supporting foot, in order to relieve it by catching the weight, and the foot itself is placed on the ground, too much under the middle of the breast. The same circumstance occurs to both feet in their turn. And the horse being thus in constant danger of falling to one side or to the other, is constrained to bring his feet near together to preserve his balance, and in doing this, strikes the foot against the opposite fetlock.

It frequently happens, that the more the toes are turned outwards, the nearer the fetlock joints are brought together, and the more the horse is disposed to cut. However, this is true only to a certain extent; for if this faulty position of the lower part of the leg be carried artificially beyond

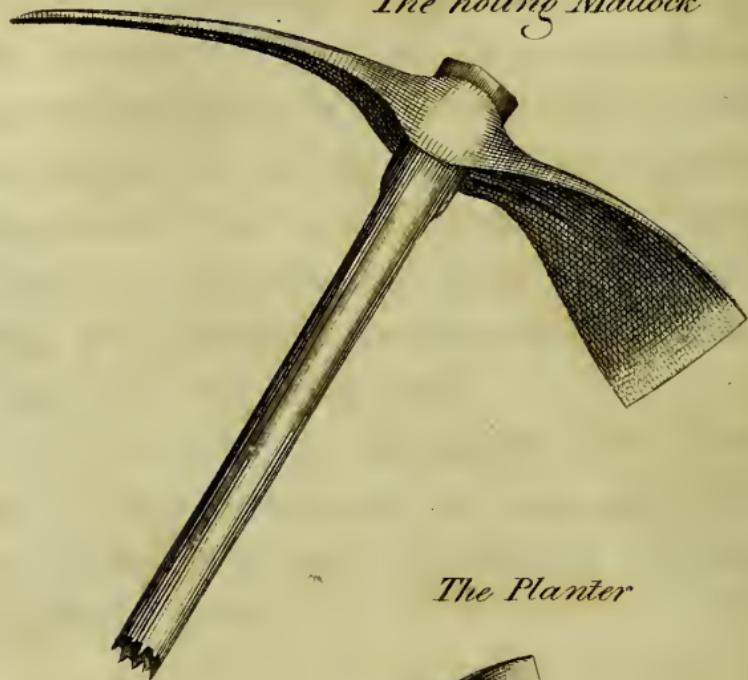
a given point, instead of producing an increased degree of cutting, in most instances it remedies the defect altogether. The reason of this is just the reverse of what takes place when the inner quarter is raised; that is to say, when the weight of the fore part of the body rests only upon one leg, it bears too much upon the inner quarter, from its being lower than the outer quarter; and thus the horse has a tendency to fall over to the inside of the supporting leg.

To prevent this, the moving foot is thrown farther from the supporting leg, in order to maintain the balance; and thus the foot misses the fetlock joint.

THE END.



*The holing Mattock*



*The Planter*



THE  
*PROFITABLE PLANTER.*  
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A Treatise  
ON  
THE CULTIVATION  
OF  
LARCH  
AND  
SCOTCH FIR TIMBER:

SHOWING THAT  
THEIR EXCELLENT QUALITY  
(Especially that of the former)  
WILL RENDER THEM SO EXTENSIVELY USEFUL,  
AS GREATLY TO PROMOTE THE  
Interests of the Country.  
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BY A NEW AND EXPEDITIOUS METHOD;  
ALSO, FOR  
THE MANAGEMENT OF PLANTATIONS.  
To which are added,  
USEFUL HINTS, *in regard to SHELTER and ORNAMENT.*

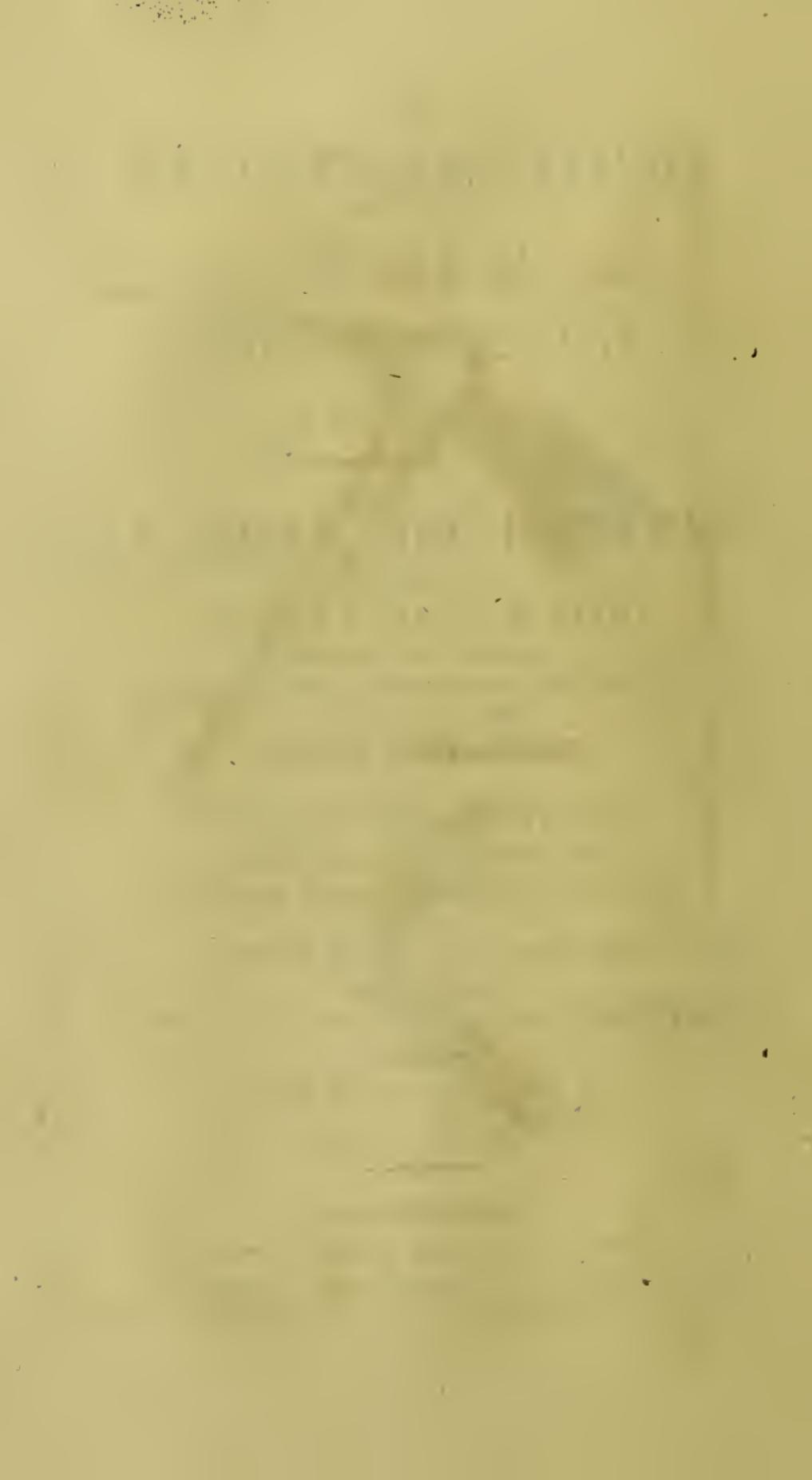
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BY W. PONTEY,  
NURSERYMAN AND PLANTER.

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## ADVERTISEMENT.

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THOUGH the writer of the following pages has, for several years, had considerable practice, as a contract planter, he means not to attach more importance to it than that of being enabled, by industry and observation, to ascertain principles, which he was previously persuaded were founded in reason and nature; nor does he pretend to any superior share of abilities; but, attached to the interests of planting, (much more from choice than necessity,) he has, from early life, when viewing the works of others, not contented himself with seeing that they were successful or otherwise, but has reasoned and in-

quired, in order to discover why they were so;—and he now presents a part of the result, for the decision (and, he hopes, the benefit) of an impartial public.

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SPECIMENS of LARCH WOOD, of a tolerable age, being, in most places, difficult to be procured, it is thought necessary to furnish them with the treatise. They were cut from the trees mentioned in page 93. Those of a greater age or flower growth would have supplied them of a finer grain; but these may give a satisfactory idea of the article.

THE

## Profitable Planter.

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THE man of science, in common with the carpenter, knows the use of an oak or an ash, but, with respect to English-grown Firs, generally contents himself with the received idea, that *they are of little value*; hence they are seldom cultivated for profit; and, though much indeed has been written, and to the purpose, on the management of oak, ash, &c. for timber, we have commonly been taught to consider the planting of firs as merely for shelter or ornament.

Relying on information so superficial, we have neglected to cultivate, properly, an article extremely useful, and of which, though several species will grow very freely in this island, we import, annually, immense quantities, at an enormous expence. A circumstance sufficient to induce the reflecting mind to inquire, whether it be not possible *to avoid the greater part, if not the whole, of that expence*, by a right cultivation of English firs ; and to feel astonished, that a subject of the first importance should have hitherto met with so little attention.

The motive for such inquiry will be greater, when we seriously reflect on the present scarcity, and consequent advance of price ; and our ideas will probably turn to the day, not long elapsed, when the article was sold at little more than one third of what it now is. And so long as we depend upon foreign markets for a

supply, it is impossible to know what means may be used, and what circumstances arise, to occasion such scarcity; consequently, impracticable to form any opinion of the price that may be exacted, or the inconveniences and injuries which the want of it may produce.

Whoever has attentively examined the subject, and has the interest of the nation at heart, must see the necessity of thoroughly investigating, whether there be any thing, in the air or soil of our country, to prevent the growing of good fir timber.

That we have few English-grown firs of sufficient scantling for the different purposes of building, will readily be admitted:—but whence proceeds the deficiency?—Prejudice says, “ we cannot grow “ them *good*;” and ignorance and indolence approve the assertion. But should

it be found that the said answer is contrary to truth, and that the scarcity in question is the consequence only of erroneous notions, it will certainly be useful to expose the same, to trace their causes and effects, and to furnish those observations which experience has suggested; for theories, however plausible, are by no means the guide a prudent man ought to follow, in the science of planting and growing timber; because, while satisfied with commonly received opinions, though it is probable we are in the right, there is a chance of our being wrong; and he is a very inattentive observer who, acting as a planter of firs, does not discover, that if men had not usually taken their ideas upon trust, the business must long ago have been reduced to something like a system.

They would have found out, not only what firs grow best in particular soils and

situations, but the peculiar kinds which thrive in most of them ; and, moreover, would clearly have ascertained, the properties of the timber of all, or at least of so many as, being little tenacious of soil or situation, were likely to be most profitable. But, unfortunately, instead of having got thus far on the road of knowledge, very few have yet made any progress ; and, which is worse, the majority see not the necessity of such a journey. In short, they have no idea of reaping any advantage from it ; why, therefore, should they labour for that which cannot profit ?

Of the truth of this, we have ample proof ; for the planters of the last age generally used Scotch ones only, in a manner that leaves us at a loss to discover what end they had in view, unless it was the rehearsal of their own funerals ; for if they had any ideas of use, shelter, or ornament, they mistook the means.

That the planters of the present age greatly surpass those of the last, is acknowledged; but, having adopted shelter and ornament, they sacrifice every thing else to them; or they would not continue to plant all the various forest trees upon all sorts of soils, and to cut down the most valuable, to make room for the most worthless.

The reader will observe, that, by the most valuable, I mean such as will be worth the most money in a given time, (suppose thirty years;) and by the most worthless, such as will produce the least in the same period:—quantity and quality being out of the question, except as they affect the price.

I would premise further, that, consistent with the preceding, I pay no regard to antiquity, for, if I find even the oak and ash mixed with larch and Scotch

fir, and the former making but little progress, while the latter are flourishing, I shall not hesitate to call them inferior;—nay, were both in a thriving state, yet, if it seem next to a certainty that the former would not fetch ten pounds, when the latter would be worth thirty, I should discard them accordingly.

If the foregoing prove the only true method of estimating the value of trees planted for profit, it is evident that the modern planters, with very few exceptions, have acted upon mistaken principles, and must continue to do so, till better acquainted with the growth and qualities of larch and Scotch fir timber.

Having already noticed the general opinion, in regard to English-grown firs, viz. that their principal use is for shelter or ornament, it seems natural to ask, how is it possible for persons to im-

bibe such a notion, when unsupported by facts?

To this I answer, that the greater part formed their ideas from report, without giving themselves the trouble of inquiry; and, of those who considered the subject, only a very small proportion had an opportunity of seeing a deal board cut from a fir of English growth, of sufficient age and scantling to enable them to determine its quality.

Were we to expect substantial timber in oak saplings, it would be accounted absurd;—is it not equally improper to seek for it in fir poles?

In regard to the Scotch fir, which is almost the only one that has had any thing like a trial, the young timber has generally been condemned as *brittle*, while the old has been rejected on ac-

count of its *knottiness*, consequently of little value for many purposes, and totally unfit for others;—but, had it been considered, whether the knots were natural or merely accidental, it probably would have been discovered, that the defect had its origin in the want of proper management.

Oaks growing in hedgerows, being single, branch out near the ground, and are suffered to retain those branches a long time; the timber is, therefore, almost uniformly knotty; while that of such as grow in thick woods is as regularly clean to a considerable height.

It is nearly similar with Scotch firs; for the usual practice of the last age was, to plant them either singly or in rows, at several yards distance from each other, where they were left to keep their branches, as long as they continued

green, whereby the timber is knotty; a fault which the present mode of planting tends much to remedy.

It is necessary that I explain what is signified by the present mode, as I write for more than one class of readers, and wish in this, and all other parts of the work, to be clearly understood:—should I be so fortunate, my end will be answered.

I mean, then, the general practice of planting large plantations tolerably thick, avoiding regular rows as much as possible; where, as with oaks in woods, the lower branches, not having a sufficient supply of air, soon die and drop off; and the trees, being, in some degree, drawn up by each other, grow straight, and free from thick branches, the cause of large knots.

It will be new to many, when told, upon the authority of the Encyclopedia Britannica, that the red deal, imported from Petersburg, is no other than the species of fir we call the Scotch; and every observation, I have been able to make, seems to confirm the fact; but, be that as it may, (the knots excepted,) the Scotch does not appear, in any respect, less valuable\*.

Here it may be important to offer a few remarks, upon the causes and consequences of the different sorts of knots, found in timber; as they equally apply to the Scotch fir, larch, oak, &c.

\* Since writing the above, I have seen some plantations of firs, (mostly Scotch,) which directly corroborate it. They were planted thickly, about sixty years ago; and, though they do not appear ever to have been pruned, the timber, to a reasonable length, is as clean, when fawn, as most foreign deal.

Live knots, or such as are incorporated with the wood from the core to the bark, whether large or small, are the remains of branches, that were alive either at or near the period when the trees were cut down; and dead knots, of such as have been left upon the trunk after they died, and, sometimes, till they have fallen of themselves:—the trunk continuing to grow, in the interval, closes upon, but cannot unite with them, and, therefore, they become dead knots from that part.

But in some trees, particularly the oak, the mischief of such dead branches does not end here; for, as the trunk continues to increase, and the dead branches to rot, it often happens that the latter, when they fall, leave hollows in the trunk, capable, from their direction, of holding water; which, acting upon the end of the branch, or knot, quickens its

decay, and not unfrequently injures the heart of the tree.

Much of the evil, with regard to dead knots, may be traced to the woodman's method of pruning, by leaving knags or spurs, of some inches in length. If the tree produce a shoot, near the end of the spur, there will be a live knot to the said shoot, and a dead one beyond it; but, when the tree produces none, (as is universal with firs, and almost general with those trees which are in thick plantations,) the whole length of the spur becomes a dead knot; so that, in either case, we have these defects, where otherwise the timber would be perfectly clean.

If the above point out the true causes, the attentive reader will easily deduce from them, the obvious means of preventing what none can cure. Aware of

the bad consequence of large knots, he will closely prune his trees, to a reasonable height, while the branches are small\*; not all at once, but from time to time; so that he will, in a great measure, form the trees, though he cannot make one leaf of them. And, for dead knots and hollowness, he will apply the same easy preventive to all branches, great or small, so soon as they appear to be dead: and, by combining causes and effects, readily perceive, that, by this practice, most sorts of timber may be grown sound, and nearly clean, to a sufficient length; as the knots will be very small, and found only near the core†.

\* Trees grown for shelter or ornament, should be pruned to suit particular situations.

† There are knots which do not originate in the core; but, as they can happen only when the tree has produced fresh shoots, from accidentally losing its

The woodman may exclaim against this doctrine, as militating against his *good old practice*, which may fairly be denominated the dead knot system; or, if he like *lazy system* better, I have no objection; for it requires no logic to prove, that it is easier to take off a branch in that slovenly manner, than to cut it off clean, and close to the stem. The practice is said to be adopted merely to prevent hollowness; and in old trees, which are no longer increasing in size, it may, in some cases, avert the evil for a time, because a live branch, so cut, will be some years before it rots; yet, when it does, the tree will be in more danger than from the mode I have recommended. But this is leaving the principal subject; which is, how to preserve a tree

head, or being over pruned, they are an exception to the regular order of nature.

clean and sound, to its full period of growth and usefulness, not beyond it.

As to the qualities of the timber of the other sorts of firs, commonly cultivated in England, besides the larch and Scotch, I have not sufficient materials to enable me to form a decisive judgment; but, from the information I have been able to collect, it seems that the greater part is much inferior; and though, from causes we are unacquainted with, there may be exceptions, yet they never can be so serviceable to the forest planter; for they do not uniformly grow as freely in fertile soils, and are improper for bleak barren lands,—those blanks in nature, which the planter's aid alone can render prolific, beautiful, and sheltered.

Though such situations must abundantly repay his useful toils, it is not meant they will do so exclusively, for the

benefit of warmer and better soils is not disputed; but convinced that on these requisites the thriving of larches and Scotch firs does not depend; that their timber is of great value; and that they improve the land which is contiguous, by affording shelter; I feel myself fully justified in asserting their superiority.

In considering the larch as a fir, which is the received opinion, and sufficient for my purpose, I have nothing to do with botanical distinctions; for it differs but little from them outwardly, except in casting its leaves or spines in winter; while its timber, with many of the properties of fir, is, in several respects, so much superior, that I should recommend its being planted alone, were it not necessary, in exposed situations and barren soils, to introduce, by way of screen, a quantity of Scotch firs.

The taste for planting has much increased within the last thirty years, especially among the higher ranks of society ; whose ideas, I believe, have seldom gone further than shelter and ornament, consequently their plantations have not become so extensive as they otherwise would ; nor been managed so as ultimately to produce, either to the proprietors or the public, half the benefit they are capable of ; and the evil may be attributed to one source, viz. an imperfect or totally wrong notion of the qualities and value of larch and Scotch fir timber, especially the former.

An assertion so diametrically opposite to current opinions, cannot be fully credited, unless it be proved ; for, where testimony is incomplete, but few proselytes are gained. We are informed, by an old observation, that *some* men will admit the evidence of hearing, but **ALL**

that of *right* ;—to this trial, then, I call every one, who has any taste for, or interest in, this important subject; and, with them, such as have an opportunity of promoting its interests, either by precept or example.

Look at the plantations of larches, within your knowledge; examine the soil, and say, if, in most situations, they do not exceed, in quickness of growth, every tree whose timber bears any comparison in value;—consider next the quality and texture of their wood:—I then leave you to determine, whether it ought not to be cultivated in preference to any other.

That larch is equal to the best foreign deal timber, for all purposes to which it is usually applied, and greatly superior to it for many others, is obvious; inasmuch as the boards are more free from

knots, harder, and less apt to split, being nearly as tough as ash, which will certainly much extend its usefulness; for, having many of the qualities of that wood, though, perhaps, not in an equal degree, it will frequently be found a substitute for it. For the oak it will also be a good one, in many instances; because its heart is equally durable, and it grows as well-hearted as any oak whatever. To which I may add, that, in consequence of its beautiful colour and fine grain, being capable of receiving a very high polish, it will be found excellent for numerous useful and ornamental articles of furniture and fixture, now made of mahogany; such as tables, chairs, desks, cupboards, clock-cases, bed-posts, balusters and rails for stairs, doors, shop-counters, cornices, &c. In a word, it will supply the place, in a greater or less degree, of almost every sort of wood now in use, from mahogany to alder; and, if

cultivated freely, will considerably diminish the consumption of the whole.

Before I quit the subject, I shall mention one thing of importance, viz. that these trees may be cut down at any season;—probably the best is in August or September, their principal time of growth. It is contrary to the prevailing opinion and practice, in regard to other woods; but, I think, will appear natural, when the properties of sap, in general, is considered, in opposition to that of firs; for the sap of most deciduous trees, or such as cast their leaves, is only a thin watery fluid; and, if the trees be cut down while that is in circulation, it tends to rot them; but that of the other, being the purest turpentine, hardens in the pores of the wood, and resists moisture; hence the durability before mentioned. This may easily be demonstrated, by taking a piece, fresh cut,

and examining it, with a good magnifier, in the sun, or by the light of a candle. Another quality, peculiar to it, is, that, though cut down, as aforesaid, it will not crack with any tolerable degree of heat.

If the foregoing account of the larch be well founded, (and the most captious will find it difficult to prove the contrary,) it appears, that the landed interest of the nation, collectively, have much to learn, in regard to its culture and uses, and still more to regret, that it was not done a century ago; for, if it had, immense sums would, annually, have been saved, which were sent abroad, and paid in duties, freights, &c. while every one who had used the article, would have been a gainer.

These advantages, though great, are not the only ones; for the lands, once

planted, would not have gone without their share of improvement; as even barren soils, if planted with firs, will, in the course of forty or fifty years, become fertile; because these trees, if the stratum be loose enough to admit their roots, draw a great portion of their nutriment from a considerable depth; part of which, ascending to their tops, forms their leaves or spines, which, falling, become the food of vegetables, and, eventually, of man.

Should a plantation, one year with another, increase one tenth of an inch, in depth of soil, for fifty years; at the end of that term, an increase of five inches will be found, of a quality that cannot fail of making it ever after good pasture land; supposing the trees cut down, and the roots not extirpated.— Thus we perceive a tree, by the simple operation of nature, performing what all

the art of man could never effect; in rendering useful what is beyond his reach; consequently, planting stamps an immense value, on what is and must for ever remain useless without it.

As many of the advantages, derivable from the planting of larch and Scotch firs, arise from duly considering, that they will not only grow, but thrive, in a nutriment totally unfit for corn or grass, I proceed to demonstrate the fact.

Part of the extensive chain of hills, which connects this county with those of Lancaster, Chester, and Derby, have been planted, from time to time; and, wherever that has been done properly, the larch and Scotch fir have uniformly succeeded.

It is observable of these hills, that, though the surface differs very materially,

the second stratum is usually a reddish yellow sand, full of loose stones. In this sand, not one stalk of grain, or blade of grass, will grow, to be of any value; and yet, when the top stratum is thin enough to admit the roots into the second, the trees are certain to grow freely.

In planting upon these hills, the top (which is a black soil, mixed with a great deal of white sand, and grows nothing but heath,) is generally the greatest difficulty we have to contend with, though, for agriculture, it is found infinitely preferable to the red sand, or second stratum; but so little nice are these trees, in regard to soil, (excepting the black earth before mentioned,) that they are seen to thrive amazingly in beds of sand, washed from the higher parts of moors into cavities in their sides; and in the hollows of old roads, or among the rubbish of stone quarries.

Almost any plantation in a shallow soil, with a loose stony bottom, will prove this; for it is not possible that the trees in them are nourished by the top soil only, when, as is often the case, they are growing freely where it is not six inches deep. Had they no other support, we should sometimes find the larch completely at a stand in its principal growing season; for, at that time, such soils are frequently so very dry as to be unfit for vegetation.

That trees have been so stopped where the soil was thin, and either a compact rock or a clay bottom, I readily allow; but I never knew it where they had a bottom something like what I have been describing.

Having now, I trust, clearly demonstrated the point in question, I proceed to show that they will thrive where seve-

ral other sorts will not; for, upon a common, called Honley-Moor, in this neighbourhood, (being part of the range of hills before mentioned, and where I have been concerned in planting nearly two hundred acres,) I occasionally introduced the oak, ash, beech, birch, and sycamore, not one of which would succeed; and, by accident, I discovered that it was the same with respect to common thorns.

About seven years ago, a gentleman, contrary to the usual custom of fencing with walls, ordered a ditch to be made, and a hedge of thorns planted, with a few two-feet larches and Scotch firs, four or five yards from each other. The larches are now, on an average, ten feet high; the Scotch firs about eight feet; and the thorns only six inches:—and, though the latter are free from weeds, (the soil producing none,) and have not

been cropped by cattle, there is no probability they will ever grow to be a fence.

Further, these trees will grow better upon such lands as are improper for corn and grass, and trees in general, than on some that have a tolerable depth of good soil. This, at first sight, may, perhaps, appear a hardy assertion ; but, I presume, it will not be disputed by any, who have had an opportunity of noticing larches, that have been planted from twenty to thirty years upon such soils, with a clay bottom ; for though they almost uniformly grow freely, during that period, yet, afterwards, they commonly grow less so, and frequently die at the top ; when no further good can be expected from them.

The reason seems to be this : supposing the depth of soil to be nine inches, and the trees planted at the distance of three feet, which is common with plan-

ters; every tree has only six solid feet and three quarters of foil, to exhaust or subsist upon; and they are generally suffered to stand, without thinning, from seven to twelve years. In that time, as their leaves or spines could have benefited the ground but very little; it is not to be wondered at, if, even before thinning, the soil should be nearly exhausted, and the trees checked in their growth; the wonder would be, if it should prove otherwise.

But admitting the trees to be thinned, within the time above mentioned, and half the number, originally planted, taken out; every tree would have only thirteen solid feet and a half of exhausted soil for its share; consequently, would be pinched of nutriment, while the trees planted upon soils with a loose bottom, constantly pushing their roots into stratum not before exhausted, and far below the ef-

fects of drought, would continue to thrive, till their ample trunks gave assurance of the desired reward.

With persons who plant upon a large scale, every thing that expedites the operation will have weight. To such, I trust, I shall render an acceptable service, by presenting them with the annexed copperplate, descriptive of two tools, which I invented, and have long used, as substitutes for the spade, in making holes and planting. The former operation, in land covered with strong heath, or full of stones, or both, when performed in the usual way, viz. with a spade and a mattock, is known to be exceedingly tedious; for, if but one man be employed, much of his time is lost by the change of tools; and, if two, it often happens that one of them has not sufficient employment.

The first is a mattock, made particularly light, with one end about five inches broad, and thirteen long, from the centre; the other, a small end or pike, eighteen inches long. With the former, which must be sharp, we strike off the sod or heath, and with the latter loosen the soil, in the place where the hole is to be made; taking out the stones, if large, but leaving the soil. This work, upon heathy land, may be done any time in summer or autumn, when labourers are most at liberty, though the land should not be planted till the following spring.

The other tool we call A PLANTER; the form of which will best be described by the plate. The length is eight inches, from the eye; the face or edge four and a half broad, and the handle twelve long. The heel, or part behind the handle, is made stronger than the rest of the neck, and is for breaking any clods that

may be found in the holes, which, by a stroke or two, will be done effectually.

The person being provided with a basket, holding the tree in one hand, and the planter in the other, strikes the latter into the soil, about the centre of the hole, and pulling it towards him, puts in the tree with the other; then pushing the earth to its root, with the back of the planter, and pressing it a little with his foot, the operation is performed, with a degree of neatness and expedition, which the most expert can never attain with the spade. The action is so simple, that a common labourer may safely be trusted with it, which is not the case when a spade is to be used; for then a dexterity is necessary, which some men are years in arriving at, and others never acquire. Even a boy of fifteen years old, or a woman may perform it, so as to do the work of men:—and though the saving, by the

use of the former of these tools, cannot be equal where the land differs from what I have described, yet they will be applicable to, and of great service in, all general cases of forest planting.

Under another head, I have noticed some objections to the planting of forest trees so thick, as at the distance of three feet; but there are others which must not be overlooked.

First, in planting trees at that distance, one acre will take 4840, and, at four feet, the same will take only 2722; so that, in the latter, there will be a saving of more than two fifths; as more land may be planted at that for three pounds, than for five at the other.

Secondly, after the above extra expence has been incurred, and the plants have exhausted the land for a number of

years, it becomes necessary to thin out, at least the difference betwixt the two numbers, when they are fit only for fuel; therefore, of but little value in any situation, particularly where fuel is plentiful: and further, which is a serious objection, by enhancing the expence, discouragement is given to the ardour of the planter.

I am aware of the defence, made by the advocates for thick planting, viz. that the trees, growing thick, shelter and draw up each other; but, on the whole, I believe, that such drawing up is more injurious than the shelter is beneficial, except, as before hinted, in very open situations; for when trees, that have been so drawn up and sheltered, and are very slender in proportion to their height, become suddenly exposed by thinning, they are frequently broken by the winds; but if they escape, being top heavy, many

of their roots get sprained, and they are so much twisted and bent, in their stems and tops, that vegetation is obstructed, and their growth impeded for several years.

Of this inconvenience much might be avoided, by looking over and judiciously thinning the plantations every year, after the trees begin to mix their branches; but, through inattention, it is frequently neglected, and more so, by a cause which I shall not fail to remark.

After considerable practice, and examining the subject with minute attention, I think four feet the most eligible, as a general distance, be the situation what it may, in regard to local circumstances. There is no waste; for every tree that is planted may remain till it is saleable, either as a rail or a spar, without injuring the rest; thus every atom of nutriment expended answers some good

end:—nor is there much fear that either this or the subsequent thinnings will be omitted; because, when men have once found that they have an article of value to dispose of, and must sell it, to benefit the remaining stock, they will not neglect to forward the business; while, on the contrary, few can set about thinning a plantation of young trees, not likely to pay for the trouble, without great reluctance.

As larches are seldom materially hurt by any other than the west and north winds, those grounds which are level, or inclined to the south or east, must have a skirting of Scotch firs to the west or north only, to screen them; that is, the first two ranks should all be firs; then fir and larch, alternately, to the breadth of ten or twelve yards; by which the winds would be sufficiently checked in their first attack. If the planter be in-

clined to add more, they may be mixed, in a sparing but regular manner, throughout the plantation.

When the ground inclines to the north or west, the plantation should have a liberal quantity of firs introduced at certain distances, in addition to the skirting, and regulated by the rise of the ground: for instance, a rise of ten yards in fifty, would require the firs every fifty yards, and so at greater or less distances, according to the ascent: but, in case of steep banks, the skirting should be planted extra thick; and the firs, in the proportion of one to two larches, should be mixed through the whole extent.

The above precautions, in regard to shelter, which are applicable only to soils not fertile enough to produce deciduous trees in general, may seem unnecessary to persons unacquainted with mountainous

situations, but a little observation will evince the contrary; for, in such places, the outside larches are crooked, and have nearly all their branches growing on the sheltered side; in which state they improve very slowly.

The size of the trees should be adapted to the particular circumstances of the place where they are to be planted. In forest planting, where the ground is healthy, or not capable of growing much grass, or weeds; and the top stratum, of black soil, is not more than six inches deep, larches of two years, which have been one year transplanted, are the most proper; these should be the best of that age, from twelve to eighteen inches high; but if the top stratum exceed that depth, larches a year older, or what are usually called two-feet plants, are preferable; for, being stronger, they sooner push into the bottom stratum, and, therefore, make

much quicker progress than such as are smaller. As to Scotch firs, those of four years old, that have been two years transplanted, are best for the situations in question, unless they be very bleak; when plants of three years old, one year transplanted, should be preferred.

In fertile lands which produce a considerable quantity of grafts, weeds, or brushwood, and where the latter has been cleared, the plants should never be less than two feet high, to prevent their being smothered. Indeed, where proper care is taken partially to clear the brushwood, so that what remains gives sufficient shelter, plants of the largest useful size may be admitted, viz. firs of three feet, and larch of four or five; for such as are higher seldom do well, except they have been removed one or two years before.

Here I think it right to give a caution in the choice of Scotch fir plants; which should be such as are stiff, and have produced branches near the ground, on all sides; as they are not only more able to resist the winds, but have generally good roots; while small weak plants, with bad ones, that have few, if any, side shoots, bend under every blast, to, and even beneath, the surface of the ground, so that a hole is formed round the stem, into which the air penetrates. By this means, many of the plants are prevented from vegetating; and such as do succeed, make but slow progress for two or three years.

The size of the holes should always be in proportion to that of the plants: for example, trees from twelve to eighteen inches high, require holes twelve inches deep, and as many wide. They ought to be sufficiently large; for though

the loose earth, in a hole six inches deep, may cover the roots, yet their chance of growing is much better when there is a quantity of loose foil for them to strike into; besides, the earth, in such holes, will retain its moisture considerably longer than in those that are shallow, especially if the planting be performed in the spring; the holes having been made some time in the summer, or latter end of the preceding year, and had the benefit of all the winter's frost, to tender and mellow them. In addition to these advantages, deep holes are very desirable, where the top soil is a black turf; as, in making them, it opens and brings up a part of the second stratum, and gives the plants an opportunity of pushing into it much sooner than they otherwise would do.

The greatest objection to spring planting is, the frequent failure of the plants, for want of sufficient moisture, particu-

larly if they have been some weeks out of the ground, in consequence of having been *brought from a considerable distance*, in severe frosts, or at the season when the sap is in motion.—It is admitted, that some trees are much less liable to be so hurt than others; but, as all must suffer less or more, (there being no mode of preventing it, when the plants are long upon their passage,) it is best to avoid the causes as much as possible.

There is a method of guarding against the effects of drought, and which may be applied as a remedy to trees in some degree injured by it, viz. puddling; which we perform thus: as we take up the trees, a person cuts a hole in the ground, and pours into it a quantity of water; he then works the soil with a spade, to such a consistency that, when the trees are dipped into it, a considerable quantity will stick to their roots: another, having

taken off the extremities of the roots, keeps dipping them, by small quantities; after which, they are bound together, in bundles of two or three hundreds each, according to size, and conveyed to where they are wanted; then placing them together in an upright position, in any situation that is sheltered, straw is carefully put round the outsides, to keep the air from drying their roots.

Provided the soil for the puddle be a binding loam, or inclining to clay, and the air carefully excluded, such plants will retain a considerable degree of moisture at their roots, for some weeks after planting; nevertheless, where the situation affords the means, the bundles should be dipped before they are unbound, as the outside plants will be somewhat more dry than the rest; but it may be dispensed with where proper care has been taken.

Should it be asked, where is the necessity for puddling, as early planting, seemingly, will render it unnecessary? I answer, that, by planting early, the holes frequently lose much of the benefit of the winter's frost; mean while, the trees, particularly in wet situations, suffer by it; being raised, in some degree, out of the ground, and left so that subsequent droughts are much more likely to injure them, than those which are planted later.

In very tender soils, and dry sheltered situations, trees not more than two feet high, may be planted with safety, any time in autumn or winter, if the weather be open; but, as the cases are not numerous, they make little difference to the general argument.

The process of puddling is so very simple and cheap, that its expence scarcely deserves notice; yet with these advan-

tages, added to its extensive usefulness, this discovery, known for at least an age, has been hitherto generally, I might say stupidly, neglected. However, I earnestly recommend it in all cases of spring planting and transplanting, whether the trees are six inches or sixteen feet high, and the advice is not theoretical, for, after practising it many years, in late planting, frequently throughout April, I never had any serious loss when the plants and holes were in proper condition ; and, I believe, most of the losses, so common among late planters, might be traced to these causes, and not to the lateness of the season.

It sometimes happens, in planting upon heathy soils, that, in certain places, the top stratum or black soil is so thick, that the trees cannot force their roots through it ; and should such soils be planted in the usual method, the trees

would be found almost at a stand for several years. In this case, the best way is to cast up the land in trenches, in a serpentine direction, by which the appearance of regular rows will be avoided, and the passage of the winds prevented: these should be intersected by others of the same sort, sloping at the sides, and about four feet wide at the bottom; except such as are to carry off the water, which should be two feet wider, and one side thrown up a little, so as to form a shallow ditch for that purpose.

The distances between them should be sufficient to hold the soil to be cast up; and the number of wide trenches, in proportion to the water likely to be collected; but care must be taken that each have only a very moderate quantity, for it will, otherwise, soon wash them so as to bare the roots of the trees.

Two rows should be planted in every trench, whose roots will eventually occupy all the land, though, in the first instance, less than half the usual quantity will be used; and if three or four inches of black soil be left in them, it will do no harm, as the roots will be planted beneath it.

This mode of planting will greatly enhance the expence; and, therefore, can be recommended only for parts of plantations, where the trees would not otherwise succeed; in which case it is certainly worth adopting.

In large pieces of planting, we sometimes meet with other parts, that are clayey and wet; this is a difficulty, and must be overcome, or the plantation will be imperfect; the first thing, therefore, to be done is, to render them dry by means of open ditches, (which ought never to

be neglected, where the ground is at all springy\*,,) afterwards, instead of making holes, a quantity of soil should be got from the nearest convenient situation, to raise hillocks, so as to plant the trees upon the surface of the ground.

As the trees for such situations should not be more than one foot high, about a peck and a half of soil will be sufficient

\* Open ditches, independent of a saving of about two thirds of the expence, in the first place, are much more easily kept in order than walled or set drains, which must inevitably be choked up by the tree roots, in a few years after they begin to grow freely; and there will then be either a considerable annual expence incurred, or they must be taken up, and left open. Besides this, where the ground lies upon the descent, they will continue to improve, by wearing deeper in moist soils, particularly where the bottom is loose and stony; for then, by taking out the stones washed bare about once a year, the ground will be effectually drained, at an expence too trivial to be noticed.

for each hillock. This work should be done in autumn, so that, by the spring, the foil will not only be mellow, but the turf beneath it, in some degree, rotten ; both which will promote the growth of the plants. But if the place be bare of grafts, and exposed to winds, it will be safer to defer the busines, to one year after the others are planted ; as, in that time, it will have got a good covering of grafts, which will prove highly beneficial, by sheltering both the hillocks and trees, and affording additional nutriment to the roots.

To such as may smile at the supposed absurdity of planting trees upon the surface of the ground, I would state, that the question is not, “ have such things “ been usually practised ? ” but, “ is it “ right or wrong ? ” Is a hole more proper for the plants, where they have nothing but clay to strike into, or a hill,

where they will have the benefit of all the surrounding soil?

General directions for planting such soils as are good, and sufficiently deep, are unnecessary; for whoever attends to what is advanced, in regard to those that are more difficult, will find it easy to plant them with success.

It is well known, that larch and Scotch firs grow rapidly upon exceeding thin chalk soils, the only difficulty being to get them to succeed at first, as they are pinched of both earth and moisture. I have known very large tracts planted in the following manner; of which, (as some practitioners seem to think it excellent,) I shall give the reader the full benefit.

The holes are made in autumn or winter, by cutting a square sod, and turning it, with the fward downwards, into the

hole ; in the centre of which they plant the trees, (in general two-year seedlings,) with a dibble or setting stick, the spring following ; and thus the process ends. A *simple* and *expeditious* method, truly ! and if equally successful, it should not want my approbation ; but, as it has frequently happened that the planters have sustained very heavy losses by it, (sometimes to the amount of half the plants,) attempting to account for it may be useful.

I observe, then, that on the sod being turned over, all or the greater part of the soil is raised up with it, and, in most cases, some of the stones below are laid bare ; probably many project higher than the surrounding soil ; so that when the sod is reversed upon them, it will be somewhat hollow, which will prevent the turf from rotting so soon as it otherwise would do ; and, consequently, in spring, when the trees are to be planted, the hole is

found nearly in the state it was when first dug; and as the extremities of the roots may be supposed to reach the bottom of the turf, or the hollow, many of them die by drought. Therefore, if one of the causes of vegetation be moisture, and this method does not promote it, so far as the particular circumstances will admit, it is clearly defective; and I leave it for decision, whether the following mode be not founded on more rational principles.

Let the workman take a planter's mattock, which is pretty sharp, and switch off the turf from the ground, as thin as possible, about two feet long and one broad, and draw it towards him; then turning to the other end of the bared place, loosen all the soil, and pull it to the part next him; he will thus have a hollow, of about one foot square, which, if not more than three or four inches

deep, must be increased to five or six, by taking out the stones; into this he must put the turf, and tread it close, to promote its rotting; then drawing the soil over it, a hollow will be left at one end, and a little hillock raised, for the reception of the trees, on the other.

If this were done early in autumn, the holes would be found in good order, in spring, to receive the plants, which should be larches of two years, that have been one transplanted, (say, the least of that age, viz. from eight to ten inches high,) and Scotch firs of three years old, which have been one transplanted.

It may be supposed, that, by raising the soil somewhat above the surface, many of the plants will be destroyed by drought. But the surrounding grafts, the mellowness of the soil, the increased quantity, and, above all, the rotten turf below,

operate as preventives; and the roots, being placed upon a level with the soil round the hole, (not below it,) will, if puddled, as before directed, be in no danger.

To obviate every possible objection against cultivating so important an article as larch, I have bestowed some time in considering such as may arise, and find but one of consequence enough to be noticed, which, I think, has more of the nature of doubt. It is this: “Whether the article “ has not had a fair trial, and been re-“ jected for some cause at present un-“ known?” I will, therefore, examine the point, and advert to what I conceive the principal causes of our ignorance, respecting its culture and uses.

Perhaps it would be difficult to discover, and avail little if known, when the larch was introduced into this country. From what we read, however, in Evelyn’s

Sylva, written one hundred and thirty-seven years ago, it appears the plant was then to be found in curious collections.

He says, “ *that it flourishes with us a tree of good stature, (not long since to be seen about Chelmsford, in Essex,) sufficiently reproaches our not cultivating a material so useful for many purposes, where lasting and substantial timber is required.* ” These are the words of a man whom succeeding ages have held in veneration, and they evince at once his penetration and his patriotism. He had heard of the extraordinary qualities of larch timber, and seen some trees, which, from their flourishing state, showed that it would thrive in this country; and, to a mind like his, that was hint sufficient.

I think I see the venerable man looking at the plant, contemplating the a-

mazing advantages that after ages would experience, from due attention to the *goodly stranger*, and calling it, as it were, to bear evidence against the negligence of his countrymen.—Unfortunately for the nation, he called in vain; for it is evident that Millar, who wrote seventy years after him, and whose authority may safely be quoted, as a favourable specimen of the knowledge of that age, knew little of the nature of larch timber, but what he had gathered from the writings of the former.

The only new observations of importance, which he produces, are, that “ *this tree is very proper for the sides of barren hills, where few other sorts will thrive so well.*” And, in another place, he says, “ *the tree is now pretty common in the English gardens;—is a native of the Alps and Pyrenean mountains; but thrives exceedingly well here, especially*

“ if planted in an elevated situation, as  
“ may be observed by those which were  
“ planted a few years since at Wimbledon,  
“ in Surry, which are now grown to be  
“ large trees, and produce annually a  
“ large quantity of cones.”

Here we have the fair result of seventy years' experience, and the aggregate is shortly this: *the trees will grow well on barren hills in England*:—which could hardly be doubted, when we consider it as a native of the *Alps* and *Pyrenees*. But, though this observation appears to afford some encouragement to plant it, for timber, it seems to be counterbalanced, by directions for raising the plants, and planting, sufficiently tedious to deter any man of common prudence from cultivating them, except on a small scale; and, probably, a general caution that he gives, in his preface, against encouraging the planting of foreign trees in large quanti-

ties, till their *WORTH* be fully known, has, in regard to the larch, operated much against its cultivation.

He and Evelyn, it is true, have both greatly extolled the qualities of its timber; but, it is obvious, the one, with the advantage of seventy years' experience, was, in that respect, barely a copyist of the other; and that the latter, instead of drawing what he communicates from experience, brought it from foreign authority:—a source which issued so much of the marvellous, that we pause in giving full credence to the account.

The above must have greatly contributed to occasion such a scarcity and excessive dearness, by circumscribing the demand, (which, otherwife, would certainly have reduced the price,) that, it is highly probable, the plant could not then be generally used, even for ornament;

hence it is that we have now so few old larch trees, and the consequent difficulty of forming a correct estimate of the value of its timber; which could not possibly have happened, had these writers been able to view the subject distinctly; as, by the weight of their authority, in planting, they might be said to direct, if not to form, the taste of their age.

When such men leave an important subject undecided, it is no wonder that those who immediately follow them do the same; for, where the former have no certainty, the latter may be permitted to doubt; and thus age after age is consumed, and man remains in ignorance.

If this be an object of national concern, it ought to have been distinctly treated as such; but I do not know that any writers have shown, that they had a clear and comprehensive idea of its im-

portance: possibly there may be exceptions, but, if found, I believe they are only, among other matter, in expensive works, rarely seen but in the libraries of the opulent: a method not much calculated to benefit the bulk of mankind, as it shuts the avenues to knowledge, which, that its advantages may be offered to all, ought ever to be open to the inquiring mind.

But whatever have been the opinions of late writers, the effects are obvious; and our concern is increased, when persons of enlarged minds and liberal fortunes, (whose exertions and example qualify them for benefiting their country,) grasp, with the most laudable intentions, all the assistance which the present state of knowledge affords, and find their efforts meet not with deserved success. Such instances are numerous, for almost the whole of their plantations show this;

and I trust there is no impropriety in producing one, as a fair specimen, taken from a person of the first consequence, as a gentleman and a planter, who has published his ideas upon the subject\*.

He planted, in two years, ninety-four acres of mixed timber trees, upon land so extremely bad (I understand, a thin chalk soil,) that nothing but fainfoin was worth cultivating upon it. The larches which succeeded best, were two years old plants, that had been one transplanted; part of which, after three or four years' growth, were from six to seven feet high. The birches throve much better than the other deciduous trees; and, though many of them died at the tops the first year, they afterwards made very vigorous shoots. The elms and sycamores did not grow by

\* See the Transactions of the Society for the Encouragement of Arts, vol. ix. p. 9.

any means so fast as the before-mentioned trees; but the larch grew so very luxuriantly, that, he says, in a few years, he should be forced to thin them considerably, to prevent their smothering the other trees.

The number and species, planted upon the ninety-four acres, were as under:

145,000	Larch
72,500	Scotch Fir
50,000	Ash
40,000	Sycamore
45,000	Elm
600	Oak
600	Spruce Fir
30,000	Birch
10,000	Mountain Ash
400	Weymouth Pine
200	Horse Chestnut

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394,300 or 4194 per acre.

From the above statement it is obvious, that the larch had, *some how or other*,

obtained a preference, as more than one third of the whole was of that species: and, from the other particulars, we might suppose their management merited superior attention; instead of which, we are told, that in a few years they must be thinned considerably, “*to prevent their smothering the other trees.*” But when we examine the list of *other* trees, (the Scotch firs excepted, as we have no account of their success, and the oaks are out of the question, being few more than six to an acre,) we find it difficult to guess, what part of them it was that deserved encouragement rather than the larch, as, with only one unworthy exception, they thrived indifferently.

Observe, the encouragement here spoken of certainly meant a permanent one; for if the larch must be so treated, to answer the aforesaid purpose, the same cause occurring repeatedly will require the same

remedy ; so that, instead of raising its lofty head, in the course of a few years, far above its fellows, and increasing in value three times as fast as any around it, the presumptuous stranger will, finally, be exterminated, to make room for its *bettters!*

“ So falls the mighty !” (not the mighty “ foe ;”) while stupid ignorance and hoary error forget not to exult.— Friends of the nation, immediately unite, in raising your voices against a practice so destructive and absurd :—inform your countrymen, that such a waste of the gifts of heaven is unpardonable :—tell them, that providence has qualified our country for producing this wood, as abundantly, and as perfect in its kind, as the grass of the field :—tell them, in recommending its culture, you bid them study their own interest, and eventually that of the human race :—tell them, too, (to shame those whom you cannot per-

suade,) that such undistinguishing havock proves them to have less sagacity than the beasts of the field; for they, the creatures of instinct, know what is necessary to their wants; but men, the children of custom, blindly overlook it.

On returning to the business of planting, the opinions of others are deserving of attention.—Some writers recommend trenching the ground, for that purpose, which will greatly forward the growth of the trees, in most cases; but, as the cost more than counterbalances the advantages, and there are other effectual methods at not an eighth of the expence, it can make no part of the system of planting for profit.

The reason for such preparation is, that the trees may receive a greater supply of nutriment, in consequence of their roots spreading freely, in a loose, moist,

and rather fertile soil; and by this it is obtained, in a greater or less degree; for ground well broken will not only be looser, but sooner imbibe, and longer retain, moisture, than such as have not had that advantage; and a strong sward, when rotted and broken, affords a nutriment highly conducive to the growth of the trees. But light soils, being, in a great measure, prepared by nature, must derive from this process much less benefit than strong ones.

There is a general observation, which the planter should particularly attend to, namely, that the necessity for preparation is increased with the size of the plants; which may be thus accounted for:—a small one, in removing, loses but few of its roots, so that its means of support continue to be nearly in proportion to its expenditure, while, in regard to the others, it is quite the reverse. This dispro-

portion may, in most sorts of deciduous trees, be reduced, by diminishing the tops, but in the fir tribe it is impracticable.

Some light soils, bearing a strong fward, are too stony to admit either the plough or spade;—when such are to be planted, with trees of two feet or upwards, it will be a good and easy method of preparation, to have the holes made in autumn, something larger than for trees of the same size, where there is no fward, and put the turf, reversed, into their bottoms.

Perhaps the following will be found the cheapest mode of preparation, it being presupposed that the land is in fward, capable of being ploughed, and in some degree fertile; as it will, thereby, without any kind of manure, bring two tolerable crops of oats; which are likely to pay for rent and labour.

The first ploughing (which ought to be deep,) should be in autumn, and the ground well harrowed in spring, when the corn is sown; by which, the sward would be rotted before the next autumn; it must then be ploughed again, but, where practicable, *across* the former ridges, and remain in that state till spring; when, in most cases, an additional harrowing and ploughing, (besides harrowing for the seed,) will have sufficiently broken the sward, and mixed the soil, to leave it in fine order to receive the trees.

Grounds which are ploughed, for this purpose, ought to be left very flat; otherwise, the plants would be sure to grow irregularly, and more particularly so in shallow soils, with a close bottom. But if the planter choose not to wait a two years' preparation, as above, he may effect the business in one, by proceeding as in the former case, till he has reaped a

crop: immediately after, the fward should be broken and the soil mixed, by the means before mentioned, which, if the land be not very stiff, will prove sufficient.—Yet as, from diversity of soil and other circumstances, no two cases can be exactly alike, he ought to deliberate, what sort of preparation, if any, will be necessary, after applying the principles already laid down.

The next mode is applicable chiefly to small patches of planting, where the plough cannot be used, and the principal object is, most rapidly to increase the growth of the trees. The best method will be to dig the ground in autumn, and plant the trees, if small, the spring following; but, if for those three or four feet high, it would be better to defer it till the ground has produced one crop of turnips or potatoes; and the trees will be greatly benefited, by the crops being continued

for two or three years ; nor need they be charged for the digging or tillage, as, under suitable management, the vegetables pay for both.

But, where such attention is inconvenient, the following plan deserves to be adopted. If gentlemen would allot the whole or part of their grounds among their poor labourers, dependents, or neighbours, as gardens, to grow vegetables in for their families, the latter would find it their interest to cultivate them for their produce, so long as the trees left room for the crops. This will apply chiefly to lands tolerably good.

It is true, that the cultivator would lose, by adopting the old mode, of planting so close as at the distance of three feet ; but, I trust, its absurdity has already been sufficiently shewn ; and if, in common cases, it be wrong, in this it will certain-

ly be much more so ; as every plant may be expected to grow freely, and, therefore, very soon occupy all the room, though planted so wide as four feet and a half. And though this will save the expence and planting of 2690 trees in an acre, (the difference between the said distances,) yet a plantation upon a stiff foil, so managed, will, at the end of five years, be every way superior to one at seven, whose trees are planted at the distance of three feet, without digging the ground.

Thus, besides saving considerably more than half in expence, and two years in time, the leafy scene becomes much more delightful ; which must ever be the first requisite in this department, and yet how seldom is it so attained as to be lasting.

Almost every person of taste acknowledges, that plantations never look so well as when young :—this general assent forms

that criterion of beauty which must furnish the attentive planter with abundant matter for reflection ; as he will easily discover the pleasing combinations necessary to form the enchanting whole, and stretch his inventive faculties, that all the permanence which is possible may be given to the effect. For though much may be accomplished, by skilfully pruning and thinning a mixed plantation, of from ten to fourteen years' growth, however injudiciously planted, yet the benefit will be trifling indeed, compared to what may be done, when they have been first properly arranged. It is, therefore, of great importance, in that stage of the business, for the planter to know precisely, whether he is to form *a shelter*, or *an open grove* : a mature judgment being necessary to arrange the one, while the puny efforts of the merest tyro suffice to form the other : hence it has almost uniformly happened, by using the same means to accomplish

different ends, that, ultimately, the result has been the latter; and thus nearly the whole of the purposes, for which it was planted, are defeated.

Suppose, for instance, a house to stand upon a gentle declivity, and the spectator placed in any situation below; here, whether the view behind be terminated by the horizon, or carried, along rising grounds, far beyond it, and then bounded by hills, the effect of the building will be, in a great measure, lost, by the view of natural objects, infinitely larger than itself:—instead of which, introduce a thick plantation, and instantaneously the building appears increased in beauty, size, and comfort; while much of the same advantage is produced upon the lands contiguous; even the screen itself, if placed that the spectator can see nothing behind but the horizon, appears, to his imagination, an extensive wood.

If such be the effect, affording, at the same time, shade, shelter, and retirement, and if the value of timber be, at least, equal, by increase, to the rent of the land, it must be painful to observe the frequent mismanagement in planting and pruning, especially as the expence is not materially different.

In examining the common defect of screens degenerating into open groves, it will be found to originate in the neglect of that excellent maxim, “ provide “ for futurity ;”—as men leave that to chance, which, if raised with prudence, would be certain of durability to old age.

The most essential quality in a good screen is closeness ; like the recesses of a thick wood, it must be impervious to the eye of the passenger ; which can never be obtained, so as to be permanent, if part of the trees composing it have not the

properties of growing bushy, of retaining branches near the bottom, of producing closer heads, by being pruned, of shooting afresh from the ground, or any required height, after being cut down, and of growing under other trees: nor can any screen long retain these qualities, except they are carefully promoted and encouraged, by frequent and judicious prunings; which evinces, that the screen-planter must attend to three distinct objects, viz. the sorts of trees proper for the body of the plantation, for the fronts, and for furnishing a supply of underwood.

In regard to the first, he may have ample choice; and, provided he introduce none that will materially overhang the rest, (like some of the spreading sorts of poplars,) he may be governed by fancy, or the particular circumstances of the soil and situation; and in this case, as in most others, the larch will deservedly ob-

tain a preference; its beauty, in every stage of its growth, being exceeded by nothing but its usefulness.

The front ranks, or second situation, must principally be composed of the following trees, viz. beech, birch, hornbeam, English elm, limes, various thorns, (especially the common one,) crabs, and laburnums; as nearly the whole of them naturally grow thick, and, by pruning, may be made to assume any form.

The third, or trees for underwood, should be beech, birch, hornbeam, oak, common thorns, limes, and holly\*: three

\* Spruce Firs will make a valuable addition to the list of underwood; as they grow tolerably under deciduous trees, (if the latter be not very thick,) by taking off their leading shoots repeatedly, so as to occasion them to spread; but never lower than the wood of the preceding summer's growth; otherwise, they will appear bald and unsightly.

of them (though not ever-greens,) retain their leaves the greater part of winter, which is equally conducive to ornament and shelter; and all of them may be trained rather like bushes than trees.

While recommending the foregoing as underwood, I mean not to exclude such of them as are proper from the body or front of the plantation; nor, in the list of trees for the major part of the first rank of the principal front, must the fir tribe be omitted; as a small proportion may be used there to advantage, and a somewhat greater in the second, which should never be so large as to smother the lower branches of the deciduous trees.—But the planter must have three distinct lists for the aforesaid purposes; and, if his ideas have not been matured by experience, he should plant each class separately; at least, the principal front will always deserve that attention.

It is devoutly to be wished, that, besides a competent knowledge of his art, every planter would endeavour to acquire so much of painting, as to know something of light and shade; for, as great part of the effect must depend upon a due mixture of plants, with leaves of different forms and various tints, when still, and when agitated by the passing breeze, if that be wanting, the scene, disowned by genius, originates disgust.

To avoid simple uniformity, though of a light cast, we have discarded the straight and long-drawn vista of unvaried foliage; and why preserve it in the curving screen?—The planter's peculiar business is, to exhibit nature in her loveliest dress; and for this the mental labours and splendid abilities of a Loutherbourg are not requisite, as she has opened her abundant store, where every figure is drawn and coloured by her matchless hand, and

arrangement's task alone is wanted, to complete the charm.

In the projecting bends of the screen, the mixture of firs should be somewhat liberal, and decrease gradually to where they recede: besides this, the appearance of such parts may be varied, by change of species, or letting different sorts predominate in each of them; and the same mode should prevail in the elevated parts of every ornamental plantation, always avoiding an abrupt change of plants: nor, in forming detached clumps must the precepts of nature be disregarded, in whose original works it is not probable, that one species was ever adopted to the exclusion of all the rest; and the skilful planter, if one sort of trees be more esteemed than another, gives, with propriety, that the preference; but, proud to copy such an instructress, introduces, with it, a greater or less variety; thereby ei-

ther making one sort the basis of several clumps, and varying them with different sorts of trees, or making separate kinds the basis of every separate clump, and varying the auxiliary plants: thus, by improving upon the simple though chequer-ed scene, he may produce that undefined something, which, with invisible fetters, binds the attention, but enraptures the mind of the admirer of taste.

The foregoing observations though applied to ornamental planting only, are equally applicable to any case of shelter and profit, where the ground is fertile enough to produce trees required for that purpose.

Before I quit this subject, I shall make a few remarks on the culture of the single trees, or small groups, whereupon most materially depends the rural scenery of our parks and lawns.

First, in regard to those found in such banks of old inclosures as are to be reduced, to level the ground:—care should be taken, after the trees intended to remain have been selected, to disturb their roots as little as possible: for want of this precaution, in thin soils, we frequently find trees, previously in a thriving state, so suddenly checked, as soon to exhibit all the marks of premature decay.

When the displacing of a great number of roots cannot be avoided, and the beauty of the trees is particularly desirable, a quantity of good light soil should be laid, for some yards round them, so deep near their stems, that the ends of the roots newly cut off may be covered; by which, they will readily strike into it; and, if it form a gentle swell, rather than a hillock, the trees, though checked at first, will generally, in a short time, resume their wonted health and vigour. This

may be accelerated, by taking off the lower branches, where they are too low, and also the extreme ends of the rest; but it must be done so as to improve the uniformity.

If old inclosures produce not the required number of trees, in proper situations, the best expedient is, where such means are attainable, to transplant them from plantations of from six to ten years' growth; and the following is an old but excellent method of preparing for it.

Admitting the planter to be apprized that he shall want a certain quantity of trees, at least one year before the time, he must mark out such as can be spared, and will suit his purpose; having the whole dug round, about eighteen inches from the stem, and the roots so cut that the plant, with its ball of earth entire, may be pulled to one side; when, if for a shallow soil,

the ball may be reduced in thickness, and the lower roots shortened. It may then be replanted in the same hole, and remain till wanted, by which time it will have produced a great number of small roots, in place of the large ones cut off: these may be shortened when the tree is removed; which may easily be accomplished without breaking the ball. But, as what has hitherto been done, is only preparatory to its future success, where the soil is shallow that defect must be remedied; and, therefore, instead of making a hole deeper than the soil, it will be sufficient to stir the earth only to that depth, leaving three or four inches under the ball, and the deficiency must be made up, as directed for trees that have been deprived of a part of their roots.

When those of the last description cannot conveniently be attained, it will be best to procure plants of a large size from

a nursery; but, instead of being planted where they are to remain, they should be set in a good garden soil, for one year, that they may produce small roots, to replace the large ones lost in removal: but, previous to being thus transplanted, they should have a complete trimming, by taking off close all the branches, to the height of seven or eight feet, and shortening those which are higher, to the length of two or three inches, as they will make shoots from these stumps, of which a number may be selected to form the future branches.

The sorts here alluded to are oak, ash, beech, elm, chestnuts, limes, platanus, and sycamores. If poplars are to be planted large for such purposes, in addition to this pruning, their tops should be shortened, as the means of stiffening their stems, at first; and it is easy to train them to a regular head afterwards.

Having stood one summer in the situation last directed, the trees may be removed; using the same precautions in regard to soil, where required, as in the two last instances; after which, if properly fenced from cattle, and secured from winds, the planter will have only to wait the event of such extraordinary care, certain that he has overcome the difficulties, and escaped the mortifying disappointment almost inseparable from this kind of planting.

Hitherto I have spoken of shelter and ornament chiefly as they relate to gentlemen's lawns and parks; but the plain man of a few acres, devoted entirely to agriculture, is not hence to suppose that he has no interest in the business; for, independent of the general want of timber, either his lands, his cattle, or his buildings need sheltering; some disagreeable object, or some prying eye, wants exclud-

ing, in common with the boisterous elements; for all which nothing is so easy, cheap, and effectual as planting; but I retract the word *cheap*, it is gratuitous,—as a plantation can seldom be prevented from increasing in value, equal to, or much beyond, the rent of the ground it occupies, except by mismanagement.

It is not a leading object of this treatise, to state in how many ways planting may conduce to the improvement of estates; but one pleasing change invites attention, where it is capable of making the bleakest scenes delightful.

For example: an estate of a thousand acres of mountainous land, usually termed barren, because of its bleakness, and let for not more than twelve shillings per acre, would cost, at thirty years' purchase, eighteen thousand pounds: if the purchaser expend a thousand more, in planting

and fencing an hundred acres, so situated as ultimately to screen the whole, allowing compound interest for that, with the accumulating rent of the land, for fourteen years, the estate would then have cost about twenty-one thousand two hundred pounds ; and the account for it, with fourteen years beyond that period, may be stated as under :

	£.
Paid for the Estate . . . . .	18,000
900 acres, improved by shelter, 3s. per acre, at 30 years' purchase . . . . .	4,050
Value of 200,000 trees, (chiefly larch,) at 6d.	5,000
	<hr/>
Estate worth, at the end of 14 years	27,050
Cost, as before mentioned, about . . . . .	21,200
	<hr/>
Improvement by planting . . . . .	5,850
Do. by trees, in 14 years more, at 1s. each .	10,000
	<hr/>
	15,850
Deduct, for rent of 100 acres, at 60l. per annum, with compound interest,—about	1,175
	<hr/>
Estate improved by planting, in 28 years	14,675

In making the foregoing calculations, I have made full allowance for the expo-

ture of situation, as it is not uncommon to see larch worth as much money in less than half the time ; but, probably, if the whole were suffered to remain to the end of the term, the improvement might not be so great ; yet, if the thinning were properly attended to, the value of standing trees, with the produce of such as were sold, could not be less than the stated average, independent of expences, viz. 1s. 6d. per tree, or 125l. per acre\*.

\* It is material to the present, as well as the principal object of this treatise, that larches will grow to considerable scantlings, though very near each other, providing the soil be suitable, (and mountainous ones are almost uniformly so;) for the nutriment collected, by pushing their roots into fresh strata, is very little wasted, either in spreading heads or useless arms ; as they need not have any of the latter, and but as few of the former as are sufficient to attract the sap to the support of the trunks ; all of which, from their very bases to where they are three inches in diameter, may be considered as valuable timber :—and, of the rapidity of their growth, the following is a direct (but not uncom-

Should the estimate for the benefit of shelter be thought over-rated, a consideration of its direct and remote consequences may probably change that opinion. Among the immediate benefits are the following: grass will not only grow more freely, at all times, but earlier and later, consequently the crops of hay will be increased much, while cattle, being better fed, and less exposed to inclement weather, will thrive better than if it were the reverse; and, which is of greater import, CORN of every sort will be more early

mon) instance. In August last, I purchased seven larch trees, of about thirty-five years' growth, containing together 199 feet of timber, or about  $28\frac{1}{2}$  each, on an average: they grew upon a thin soil, with a loose bottom, of reddish yellow sand, in a plantation of oak, ash, beech, sycamore, &c. which, though of the same age, were then so inferior in value, that even the best of them would not have fetched 8s. per tree.—Any objections, from apprehensions of exposure, (by displacing the lower branches of the larch,) will be obviated, on turning to the observations on shelter.

and regularly ripened, of course heavier ; besides being screened, while standing, from the *ruinous effects of shaking winds*, for which there is no other remedy than cutting down the grain before it is ripe, to prevent its being wasted.

Many are the remote benefits of shelter ; but I shall content myself with one, the fruitful parent of all the rest. It affords the facility of converting the once cheerless and solitary wilds into the social haunts of men, who never fail to bring with them their wants and their resources ; and, if duly encouraged, population is as certain to increase : while that is the case, the fertility and consequent value of the surrounding fields increase too ; for it is rare indeed to find land cheap where men are plentiful, and still more so to find their numbers, once established, decrease, except through the wretched policy of rapacious or mistaken landholders.

I have been anxious, through the foregoing treatise, to acquaint the reader with principles rather than opinions ; the one being unalterably fixed, while the other must ever be as various as the attainments of man :—this compels the pupil of the latter, always infirm, to move on crutches, while that of the former, loose from trammels, feels conscious of his strength.

Consistent with this, calculations have been avoided, (except one which became peculiarly necessary,) as the weight of produce will always differ with varying circumstances ;—whoever, therefore, is inclined to plant for profit, should make his estimate from the state of plantations upon land of a similar description to his own, and that in the neighbourhood ; if the one have succeeded, he need be under no apprehension for the other.

Far from being unduly biased by the interests of my profession, this system has economy for its basis ; and having eighty acres thus planted, on my own account, I am conscious of acting and writing upon the same principle, viz. **UTILITY** :—for I have long been convinced, that it is not only practicable but easy for this island to grow fir timber, for its own consumption, without opposing the interests of agriculture. The end is confessedly important, and to promote the means, my best endeavours, though feeble, have not been wanting : and if in this or any future attempt, to forward the same **GOOD CAUSE**, they be found in the least degree successful, I shall have the consolation to think, that I have not lived in vain.